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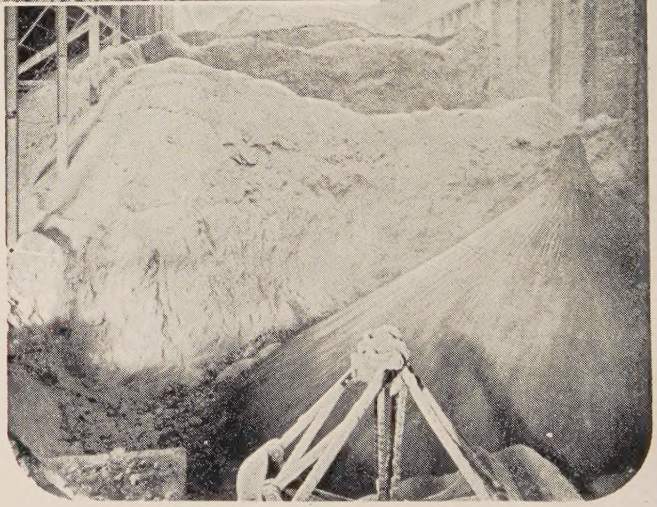

Large Stocks of Matured Fertiliser

THE NORTH ISLAND SUPERPHOSPHATE MANUFACTURERS

Volume 80
Number 1
January 16,
1950.
(Established 1910)

NEW ZEALAND JOURNAL OF Agriculture

Published by
Direction
of
Hon. K. J. Holyoake,
Minister of Agriculture.

This month's cover

Part of a sea-girt farm off New Zealand's east coast forms the subject of this month's cover, which has been reproduced from a painting by L. C. Mitchell and is based on a Weekly News photograph. The rugged country shown is on Great Mercury Island, which lies 25 miles south-east of Cape Colville, most northerly point of the Coromandel Peninsula. In the foreground of the picture are some of a group of rocks named Stonehenge from a fancied resemblance to the huge standing stones on Salisbury Plain, England. Great Mercury Island, on which the land rises at one point to 748ft., is used for sheep farming.

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The "Journal" is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available at 3d. a copy, post free.

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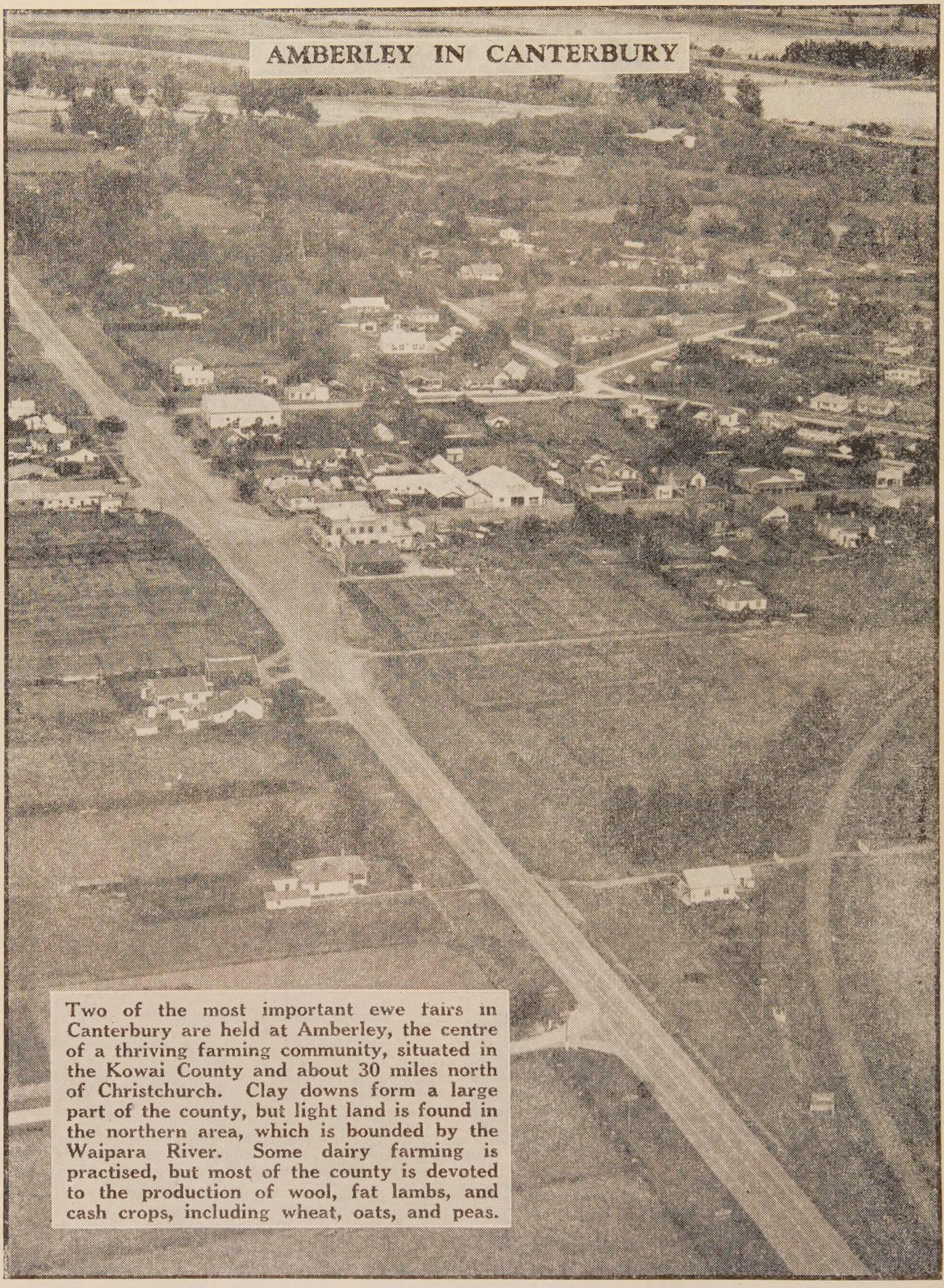
All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture," Box 3004, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

AMBERLEY IN CANTERBURY



Two of the most important ewe fairs in Canterbury are held at Amberley, the centre of a thriving farming community, situated in the Kowai County and about 30 miles north of Christchurch. Clay downs form a large part of the county, but light land is found in the northern area, which is bounded by the Waipara River. Some dairy farming is practised, but most of the county is devoted to the production of wool, fat lambs, and cash crops, including wheat, oats, and peas.

[V. C. Browne photo.

MESSAGE FROM NEW MINISTER OF AGRICULTURE

I AM very glad of the opportunity early in my appointment as Minister of Agriculture to send a message to all farmers, to whom the allocation of the portfolio I am so proud to undertake is always of vital interest in any change of Government.

I intend to visit various parts of the Dominion as soon as possible and make myself more fully acquainted with the problems of all sections of the farming industry, but in the meantime I have a valuable opportunity through the "Journal," which circulates so widely among the farming community and those engaged in ancillary industries, of giving an assurance that primary production has been accorded a high rating in the Government Mr. Holland has formed.

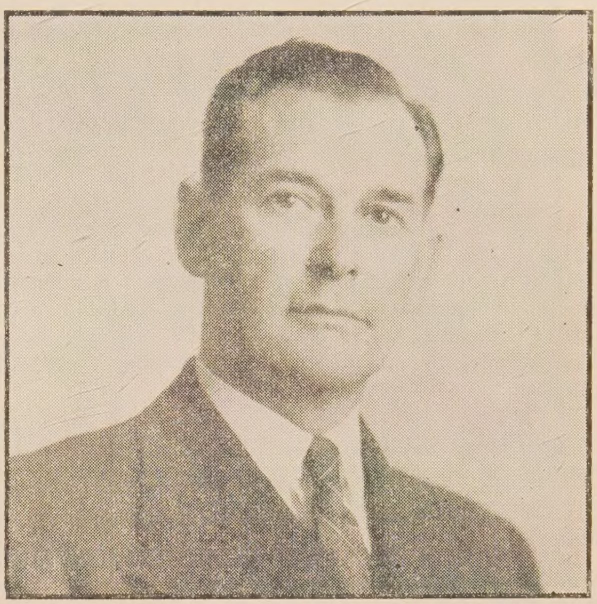
I realise that I have a big job on my hands, but I hope that my own farming background will stand me in good stead. My Parliamentary Under-Secretary, Mr. S. W. Smith, is particularly well equipped to deal with problems of interest to dairy farmers.

I am very conscious of the fact that the basis of New Zealand's economic standards is the country's primary industries. There has been an inclination to overlook the fact that in the economic structure of New Zealand agriculture must always be the cornerstone. It has been so throughout the nation's history and it will continue to be so. The man who owns land and cherishes it and works it well and those who work with him are the source of our stability as a nation.

In my portfolios of Agriculture and Marketing I will administer the two Departments of State most concerned with the production and distribution of our agricultural, pastoral, and horticultural products, and I can assure farmers of the Dominion that in me they will find a most sympathetic friend. Their problems will also be mine and in a spirit of mutual good will we should play an ever-increasing part in the economic and social progress of our country.

The decision to include the portfolio of Scientific and Industrial Research with Agriculture is one that particularly pleases me and one that I hope will be welcomed by all progressive farmers. A good farmer in our day needs to know more about more things than most men in other professions. Biology, mechanics, botany, horticulture, and veterinary practice are among the many things with which he must be familiar, and he has to be ever ready and eager to absorb new knowledge and new ideas.

BIOGRAPHICAL— Mr. Holyoake was born at Pahiatua, and also lived in the Hastings and Tauranga districts, but his family returned to Motueka when his father took over the farm of Mr. Holyoake's great-grandfather, Richard Holyoake, who landed at Motueka in 1842. Mr. Holyoake went on to the Motueka farm when he left school. Thus he is a fourth generation New Zealand farmer. Brought up on a dairy farm, he milked cows for many years. His chief occupation, however, has been horticulture, mainly fruit, hop, and tobacco growing. He is now sheep and cattle farming on hill country near Dannevirke. Mr. Holyoake was first elected to Parliament for Motueka in a by-election in 1932 and held that seat until 1938. He was elected for his present constituency of Pahiatua in 1943. He was for 10 years president of the Nelson Farmers' Union and for several years Dominion vice-president. He was also prominent in the formation of Federated Farmers of New Zealand, and at the first world conference of farmers held in London in May, 1946, he was one of the New Zealand delegates. As deputy leader of the Opposition Mr. Holyoake was always prominent in debates on agricultural topics.



[*S. P. Andrew Ltd. photo.*

Mr. K. J. Holyoake.

It has always seemed to me desirable and necessary to ensure co-ordination and correlation of the large amount of research into agricultural matters which in New Zealand is done in many places and under the direction of many bodies. The research of several of the Divisions of the Department of Scientific and Industrial Research concerns agriculture and the farmer, and my administration of this additional Department will enable me to encourage correlation of this work to the benefit of both the research worker and the farming community.

I have a profound confidence in the future of our agricultural and pastoral industries. With the natural advantages this country has and the knowledge that research is continually making available, there are tremendous possibilities before us. There is no more dignified calling nor one in which the world is more vitally concerned than that of those who dedicate themselves to wresting from the soil the necessities of life, and I will do everything possible at all times to advance the welfare of men and women on the land.

—K. J. HOLYOAKE,
Minister of Agriculture.

CARE OF LIVESTOCK DURING FEBRUARY

Contributed by the Animal Research Division.

PREPARATIONS FOR TUPPING

If the ewes have been held on short pasture since weaning, they should now be in good, hard condition. About 14 days before tupping they should be crutched and given the best pasture available to ensure that at the time of mating they are rising in condition, which is one of the most important factors in providing a good lambing percentage. Rams, too, should be crutched and flushed for about 3 weeks before tupping. They should be dipped before this flushing period, as dipping too close to tupping appears to reduce ram fertility.

* * *

COPPER DEFICIENCY

Scouring in cattle and staggering in lambs grazing on peat land can be prevented by topdressing the pastures in the autumn with 5lb. of bluestone per acre. Copperised superphosphate is now available, or the bluestone may be mixed with lime.

* * *

CARE OF CALVES

Autumn is a critical period for calves. Deaths during winter can be eliminated by rotating the calves through the paddocks ahead of the cows at intervals of 3 or 4 days. If this is not being done, it should be commenced immediately. Calves treated in such a way will be up to 100lb. heavier as yearlings than those kept confined in a calf paddock. If calves are unthrifty and scouring, it may be necessary to give two or three doses of phenothiazine at three-weekly intervals, but this is seldom necessary with calves which are rotationally grazed.

["*New Zealand Dairy Exporter*" photo.

* * *

COBALT DEFICIENCY

Bush sickness can be prevented completely by topdressing annually with 1cwt. of cobaltised superphosphate per acre, and in the North Island, at least, this is best applied in the usual autumn topdressing. The rate given supplies adequate cobalt and if more superphosphate is used the additional amount need not be cobaltised. For fuller details on this subject consult the Department of Agriculture's Bulletin No. 180, "Cobalt Deficiency in Sheep and Cattle."

* * *

FACIAL ECZEMA

If warm rains fall in February after a spell of hot, dry weather, facial eczema is likely to occur in districts which are usually affected. Experience in 1948 showed conclusively that the disease can be prevented by shutting sheep up at the rate of at least 100 to the acre as soon as the rains fall and keeping them so confined until the weather becomes either hot and dry or much cooler and the pasture visibly hardens. If dry periods occur, plans should be made for action along these lines: Feeding of good hay at the rate of 2lb. per sheep per day, which will prevent loss of condition; crops of rape, kale, turnips, chou moellier, or lucerne, if they are available, can safely be grazed during the dangerous period.

* * *

PULLORUM DISEASE IN POULTRY

Preparations should now be made for the autumn hatch by blood testing the flock for pullorum disease and by cleaning and fumigating the incubators. A vacuum cleaner is ideal for cleaning and advice on fumigation may be obtained from the local Poultry Instructor of the Department of Agriculture.

* * *

COWS RETURNING TO THE BULL

If a number of cows are returning to the bull 6 weeks after service, they are probably infected with trichomoniasis and a veterinarian should be consulted immediately.

* * *

SOWS AND WEANERS

Sows which are to be remated should receive 6 gallons of milk per day for the first month after the litters are weaned, as this will greatly facilitate getting them in pig. Weaners should be fed up to 1lb. of meal per day, as fast growth in the earlier stages means heavier pigs when the milk supply fails. Pens showing deterioration of pasture should be harrowed and surface sown or ploughed in preparation for a crop.

THE HOME GARDEN IN FEBRUARY

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

MOST home gardeners will now have an abundance of vegetables at different maturity stages, and the harvesting of green peas, dwarf and runner beans, root crops, onions, cucurbits, and salad vegetables will have fully recompensed earlier efforts in the garden. Where results have not been so encouraging inexperienced gardeners should not be discouraged; insufficient knowledge of certain phases of gardening perhaps has been the main reason for lack of success and perseverance will bring its reward in due course.

[*Sparrow Industrial Pictures Ltd. photo.*

Harvesting a good crop of onions.

ALTHOUGH the main activities in the garden during February will be the harvesting of vegetables, there is plenty of other important work to be done. Beetroot, silver beet, spinach, radish, turnip, lettuce, spring cabbage, and in northern districts cauliflower and brussels sprouts seed can be sown, and, provided soil moisture is satisfactory and good sturdy plants are available, celery, savoy cabbage, cauliflower, and leek plants can be set out.

Seed of parsley, mustard, cress, endive, and in the warmer districts carrots, peas, swedes, and a few rows of a hardy variety of dwarf bean such as Sydney Wonder may be sown.

Tomato crops which were planted in October and November will now be in full production and, if given the necessary attention, will continue to yield for several weeks. Lateral growths should not be removed past the seventh fruit truss but should be left to grow at will. Keep plants supplied with adequate moisture and tied to supports and remove surplus shoots from leaf axils. Spray them regularly with Bordeaux mixture or with a certified copper oxychloride mixture to prevent blight and with a recommended insecticide such as lead arsenate or D.D.T. to control the tomato worm.

Although the food value of tomatoes may be slightly greater when the fruit is permitted to remain on the vine until thoroughly ripe, such a practice often results in a loss through damage by birds. If birds are troublesome, it is best to pick the fruits when they are just changing colour and keep them in an ordinary kitchen temperature.

Do not place them at a window exposed to strong sunlight, as this will induce sun scorch and render the skin tough and unpalatable.

[*Sparrow Industrial Pictures Ltd. photo.*

Chives, which make a good border plant, should be kept cut to promote new tender growth.

The hoe and other cultivating implements should be kept going to keep the surface soil loose, as soil quickly becomes packed by watering or through walking over it. A loose, dry mulch not only helps conserve the moisture, but makes conditions less favourable for the germination of surface weed seeds. On heavy soils that are inclined to crack a mulch of sawdust an inch thick will be found advantageous in the conservation of moisture, and later worked into the soil it will help make it more friable. Sawdust may be spread close up to plants and will prevent the roots from drying out.

Asparagus beds should be kept weeded and if the fern growth is falling over it should be supported. Stakes driven in at intervals around the outer edge of the bed and strong string tied around them will usually provide the necessary support.

Crops such as beetroot, carrots, parsnips, swedes, turnips, and lettuce should be thinned, and all crops should be kept weeded. Weeds not only rob the plant of its food, but are hosts for insects and disease. At this time of the year weeds are easily destroyed by light hoeing.

Peas, beans, and cucumbers should be harvested as they reach maturity; plants if allowed to develop seed lose vigour, and a consequent decline in yield will result.

Insect pests and diseases are usually very troublesome at this season and recommended preventive sprays or dusts should be applied to brassicas. In districts where potato blight is troublesome potato crops should be sprayed at regular intervals. A careful watch should be kept for leaf spot disease on celery and celeriac and as soon as it appears a protective spray should be applied.

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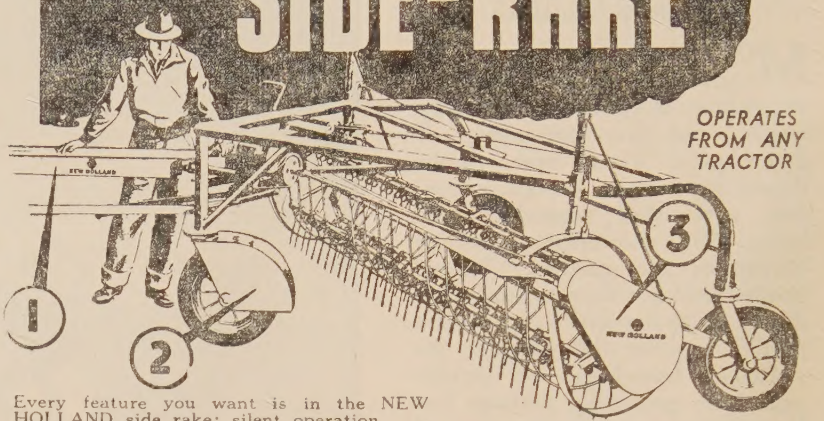

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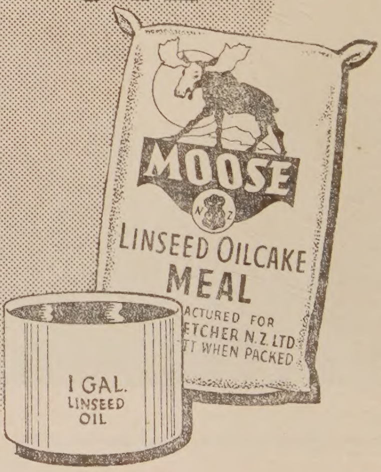


they appear. If left to mature seed, they have an exhausting effect on the crown and may cause poor leaf and stalk development next season.

Watering

Do not allow the soil to become too dry around growing crops. Celery, beans, peas, and lettuce should receive plenty of water; organic liquid manure is especially beneficial to celery, celeriac, and lettuce crops.

Most onion crops should now be ready for harvesting; this condition can be recognised by the leaves turning brown or drying up. They should be pulled and spread out in a dry sunny place to dry off thoroughly, after which they may either be strung up in bunches, or placed thinly on a wire-netting rack and stored in a cool, dry, airy place where plenty of light can enter. If properly matured, dried, and stored onions will keep in perfect condition for 7 or 8 months.

Ground not required for immediate cropping should not be allowed to remain in a consolidated condition and fostering weed growth, but should be dug over and left in the rough to weather or sown with a cover crop such as blue lupins or mustard.

Kumara vines should be lifted to prevent them attaching themselves to the ground, and the ridges in which the tubers form should be kept hoed up. Kumara plants give no indication of maturity; this condition can be recognised only by examining the tubers and by the length of time that they have been growing. They are usually ready for use 5 months from planting, but should not be dug for storing until the skins are reasonably firm and will not rub off by pressure of the finger.

Shallots are usually harvested in February. Bulbs intended for long storage should be handled carefully during harvest so as not to impair their keeping quality. After pulling they should be left to dry thoroughly before storing in a shed where the light and air circulation are good.

[*Sparrow Industrial Pictures Ltd. photo.*

Shallots should be ready for lifting about January or February and this condition is shown by withering of the tops and bulb development.

Celery

In localities where growth extends well into the winter celery can still be planted. It requires a deep, rich, light, loamy, moist soil, and will not grow well on heavy or clay land. The land must be dug deeply and if necessary well enriched with good well-rotted stable or farmyard manure. At this period of the year celery is best set out in beds on the flat. Good plants are usually available from seedsmen and nurserymen. Celery may be set in single or double rows or in a bed. In single rows the plants are spaced about 8in. apart; in double rows the spacing is the same, but the two rows are placed side by side about 1ft. apart. In bed culture the plants may be set 1ft. apart each way. Row culture is best if the celery is to be banked with earth for blanching. Water the young plants regularly, and if the weather is hot keep them shaded after planting until they become established.

Varieties: Golden Self-blanching is recommended for planting in Auckland and surrounding districts, and in districts where heavy frosts are experienced a hardy variety such as Solid White is preferable.

Parsley

Parsley is probably the most widely grown garden herb and one that is in constant demand. To ensure a constant supply seed should be sown in February or March for winter and spring use and from August to October for a summer and autumn supply. Seed for summer crops should be sown in a moist, shady situation. The plant is a biennial (that is it develops seed the second year) and when seed stalks develop the plant is useless for further supplies. The seed germinates slowly, sometimes taking 4 to 6 weeks. If soil conditions are dry, soak the seed for a few hours in warm water before sowing it.

When harvesting, the outer and larger leaves should be removed successively and the plant will continue to produce for several months. Taking a leaf or two from several plants is preferable to stripping one plant, and results in a greater total yield and better quality. When the plant has not been harvested for some time the leaves become coarse, but young growth can be renewed by severe cutting; this operation will sometimes retard seed-stem development, which is hastened if the plant is left alone.

Parsley thrives in any good soil, but as the seedlings are delicate during early stages of growth, the soil should be in a good condition of tilth and prevented from caking and should be kept moist. Fertilisers will increase the yield and a dressing of blood and bone worked lightly into the soil at the rate of 2 to 3oz. a square yard usually gives satisfactory results. Soils with a high humus content should be given a dressing of lime, and sulphate of ammonia at the rate of 1oz. a square yard should be applied also.

[*Sparrow Industrial Pictures Ltd. photo.*

The parsley bed should be close to the path or lawn to be convenient for the housewife.

THE HOME GARDEN IN FEBRUARY . . .

Seed can be sown broadcast and lightly covered with soil, or sown thinly ¼in. deep in rows 15 to 18in. apart and later thinned to 6 to 8in. between plants. If plants are not thinned, they soon crowd one another, which results in poor leaf development.

If parsley is wanted for storing as dried parsley, a few of the best young leaves should be picked as they develop. The leaves can be placed for a few minutes in a fairly warm oven (about 100 degrees F.) with the door open. Rapid drying retains the oils that give parsley its characteristic scent and it also assists in the retention of the natural colour. When dried, parsley should be pulverised by rubbing it between the hands, and any coarse pieces of stalk should be removed. It can then be placed in bags or jars and stored in a dry place.

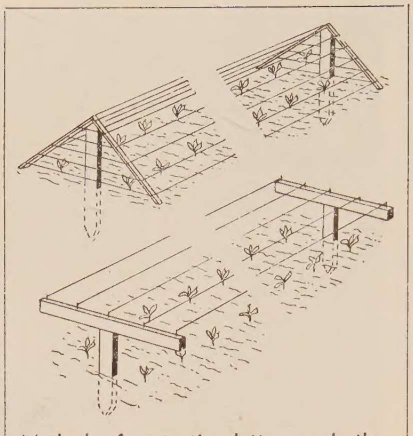
If the parsley leaves are gritty with soil from rain splash, they should be washed in cold water, as hot water will impair their qualities for drying.

The most popular variety is Extra Curled (Moss Curled), a compact plant, with dark-green leaves closely curled and resembling tufts of moss.

Peas

In the Auckland district and surrounding localities where autumn conditions are not sufficiently severe to retard the development of the pods quick-maturing varieties of peas can still be sown. If conditions are dry, watering before and after planting may be necessary to secure quick germination of the seeds and to promote rapid plant growth.

Although peas like cool weather, frosts of more than a few degrees at the podding stage will retard development and cause possible failure.



Methods of protecting lettuce and other plants from birds, using wooden supports with black cotton attached; these types can be moved easily from one bed to another.

The culture of peas was described in last month's "Journal."

Varieties: There are several dwarf varieties which under favourable conditions mature in from 60 to 70 days. Recommended quick-maturing dwarf varieties are Earlicrop, Utility, Blue Bantam, Little Marvel, and W. F. Massey.

Salad Crops

The inclusion of fresh salad in the diet is of considerable assistance in the maintenance of good health. There is no close agreement as to what crops actually come under the designation "salads," but the term usually covers lettuce, endives, chives, watercress, radish, mustard and cress, tomatoes, and cucumbers.

Salad crops are in demand throughout the greater part of the year. Their production at certain times is a little difficult and requires special care and the use of intensive methods.

Salad crops to be at their best must be grown quickly, and any retarding of their growth, especially when they are nearing maturity, will result in coarse, tough products.

Lettuce

Lettuce, which is undoubtedly the main salad vegetable in New Zealand, is not easy to grow well unless conditions are favourable. It requires a rich, sweet soil with a fairly high degree of moisture from seeding to harvest; wide fluctuations may cause the plant to bolt to seed prematurely or result in poor heads which are tough and bitter. Although the soil should not be allowed to become dry, it should never remain too wet for any length of time following rain or irrigation.

A fertiliser such as blood and bone broadcast at the rate of ½lb. a square yard after digging and before planting should give good results. Just before the plants begin to heart nitrate of soda applied between the rows—it should not contact the stem or foliage of the plants—at the rate of 1oz. a square yard and worked in lightly will promote satisfactory growth. Weekly applications of liquid animal manure may be used instead of nitrate of soda.

During February seed should be sown ¼in. deep in rows 12in. apart and plants thinned from 9 to 12in. apart in the rows as soon as they are large enough.

Varieties: A variety which is suitable for a wide range of conditions is Webbs Wonderful, also called Neapolitan and New York; there are two strains, winter and summer. Great Lakes, which is a recent introduction, is ideal for summer growing. For the home garden a leaf type of lettuce such as Bronze Beauty is excellent, as it is easy to grow, matures quickly, and is resistant to hot conditions. Bronze Beauty has leaves which are reddish bronze overlying a pale green and have a delicious nutty flavour.

Endive

Endive is a particularly useful salad plant and can be substituted during the winter months for lettuce. It is much hardier and easier to grow than lettuce and has a pleasant nutty flavour.

Endive must be grown quickly and must not receive a check while growing; otherwise the leaves tend to develop a bitter flavour. Partial blanching usually improves the flavour of the leaves and renders them more crisp and tender. Successful blanching depends on excluding light from the inner leaves and keeping them dry. A convenient method is to gather the leaves in a bunch, when they are perfectly dry and the heart is nearly mature, and tie them near the top. Blanching may also be done by covering the plants with heavy paper or with two boards nailed together to form an inverted V. In warm, moist

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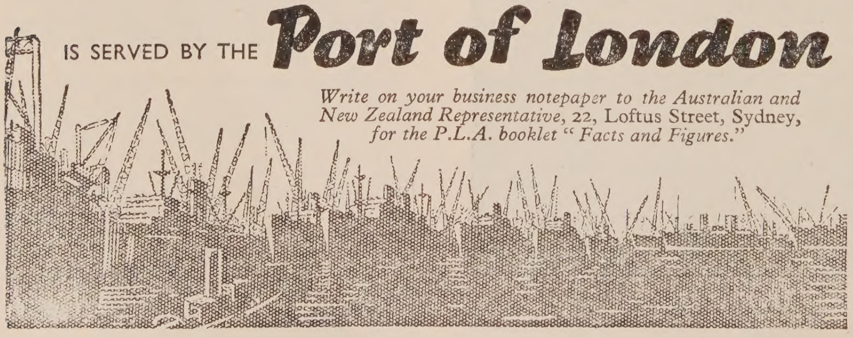


[*Sparrow Industrial Pictures Ltd.* photo.

Early and late peas will produce heavier yields and better quality pods if they are not allowed to contact the soil, and they should be supported.

weather examine the plants frequently, and if the hearts are beginning to decay, remove the covering.

Like lettuce endive requires a deeply worked rich soil. After digging the ground add a fertiliser mixture containing 4lb. of blood and bone, 1lb. of superphosphate, 4oz. of sulphate of ammonia, and 2oz. of sulphate of potash at the rate of ½lb. to each square yard and work it into the top 3in. of soil.

Sow the seed ¼in. deep in an outdoor seed-bed in February and keep the bed moist during dry weather. When seedlings are large enough to be handled they should be transplanted during favourable weather to their permanent position. If the weather is hot, plants can be watered out and shaded with newspaper for a day or two to protect them from the sun. Plants should be set out in rows 24in. apart, allowing 12in. between plants.

Green curled is a suitable variety for sowing now.

Chives

Chives make an excellent substitute for spring onions and should be grown in every garden where the flavour of the onion is appreciated. The leaves, which have a mild flavour, are particularly useful for seasoning.

Chives are easy to grow and do not require any particular soil. They make a good edging plant for the home garden, as once the bulbs are planted they need not be disturbed for 3 or 4 years. The best time to divide the clumps for replanting is in the early spring or autumn. Clumps should be set 9 to 12in. apart, and if more than one row is required, rows should be spaced 15 to 18in. apart.

When the plants are well established it is an advantage to cut the foliage frequently, as new tender growth will develop.

Watercress

Watercress (*Nasturtium officinale*) is a moisture-loving hardy perennial with a branching and creeping stem. Its natural habitat is damp situations, usually in or alongside ditches or shallow streams. As an edible plant for salad purposes it is to be recommended, since, in addition to the medicinal properties derived from its oily and mineral contents it contains vitamins, which play such an important part in nutrition.

Watercress, which may be propagated either from seed or by cuttings taken from stock-beds, does best when sown in early spring along the edges of creeks or shallow-running streams, but it may be grown readily in any moist soil. It will often grow luxuriantly in ordinary ditches free of running water but where the soil never becomes dry and hard.

For garden culture the seed should be sown ¼in. deep in rows 12 to 18in. apart in spring or autumn, and when the plants are large enough they should be thinned to 6in. apart; 1oz. of seed is sufficient for a row 100ft. long.

Mustard and Cress

Mustard for salads or garnishing is grown in precisely the same way as cress and is harvested at the same stage of growth. As cress takes longer to mature, it should be sown about 5 days before the mustard so that both will mature at the same time.

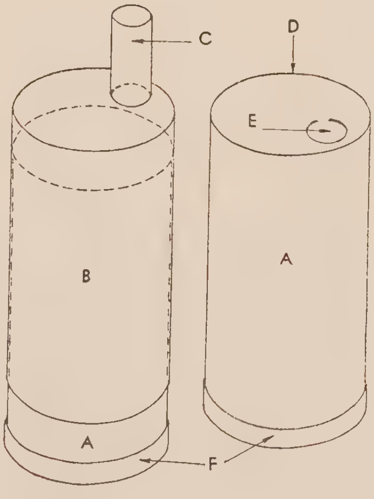
Mustard and cress are hardy and seed can be sown the whole year round, but during hot weather it is desirable to select a shady position. Seed may be broadcast thickly and covered lightly with a sprinkling of fine soil. The ground should be kept well supplied with moisture to produce crisp and tender growth. The crop should be ready to cut for salads in from 3 to 4 weeks, and may be gathered as soon as the true or rough

USEFUL SEED SOWER MADE FROM TINS

To many gardeners who find it rather difficult to sow small seeds evenly and economically, especially when a strong breeze is blowing, the simple and inexpensive seed sower illustrated should be very helpful. It was designed and has been used successfully by Mr. W. Blackie, of Mosgiel.

The principal parts are two tins one of which slips easily but neatly inside the other. Mr. Blackie used a ½lb. coffee tin (A), and a common type of baking powder tin (B), but similar tins which fit neatly one inside the other would do equally well. The inner tin (A) is the seed container and should be fitted with a lid F. It has no rim at the bottom edge D because when it is slipped into place, it must come into close contact with the bottom of the outer tin B.

Corresponding holes ¾in. in diameter are made near the outer edges of the bottoms of the tins as shown at E. The edges are smoothed and a spout 2 or 3in. long C is soldered over the hole in the outer tin. Though not absolutely necessary, the spout is a decided advantage.



To operate the sower the tin A is slipped into the outer tin B and turned so that the ¾in. holes do not coincide. Seed is then placed in the sower and the lid replaced securely. The rate of sowing is regulated by screwing the inner tin round until the two holes make an opening of the required size. The size of the aperture is regulated according to the kind of seed to be sown and the thickness of the sowing, but practice soon shows how to adjust the device.

leaves appear, when the plants should be cut close to the surface of the ground.

Radish

Radish are a little difficult to grow successfully in hot weather unless the soil has a high humus content and there is adequate moisture. If possible, select a position with partial shade such as alongside sweet corn or a similar tall-growing vegetable. The top 6in. of soil should be well cultivated and very rich in well-decomposed organic matter.

Sow the seed thinly ½in. deep in rows 6in. apart and gently firm the soil over seed after sowing. The soil should never be allowed to become dry.

Varieties: There is a fairly wide range of varieties, but the more popular ones are Long Scarlet and French Breakfast.

Silver Beet and Spinach Beet

Silver beet also called Swiss chard and sea kale beet is grown for its foliage. The broad succulent leaves are prepared for the table and cooked like spinach, while the stalks can be boiled and served with white sauce. Given favourable conditions, silver beet produces heavy yields, but although it stands well, it does not yield for as long as a spinach beet, a closely allied plant, the leaves of which are a splendid substitute for spinach.

Perpetual spinach or spinach beet has smooth green leaves with slender midribs of lighter green. Nearly all varieties of spinach beet are similar in habit and do not develop a main stem until they are ready to seed, but instead develop numerous leaves which may be harvested over a long period.

Spinach beet once established is more tolerant of adverse weather conditions than true spinach and will produce a continuous supply of greens during hot weather when spinach is rather difficult to grow.

Both silver beet and spinach beet are hardy, relatively quick maturing vegetables and grow well in hot or cool conditions. For most northern districts seed can be sown from August to March, but for districts where growing conditions do not extend well into the autumn early February would be the latest it would be advisable to sow seed.

For best results the soil should be drained, well cultivated, and enriched with decomposed organic material such as stable or farmyard manure; failing this a complete fertiliser (containing nitrogen, phosphoric acid, and potash) such as blood and bone 3 parts, superphosphate 1 part, and sulphate of potash 5 per cent., all by weight, applied at the rate of 8oz. a square yard will suffice. As beet is rather sensitive to soil acidity, the soil should contain sufficient lime and, if there is any doubt in this respect, a dressing of carbonate of lime at 4oz. a square yard should be made.

Varieties of silver beet or Swiss chard: Lucullus, an erect variety, has broad, rounded, thick, pale-green stems, with light-green, ruffled foliage. Fordhook Giant, a tall, vigorous-growing variety, has broad, dark-green, heavily ruffled leaves and a thick, white stem. Large Ribbed Dark Green, which has smooth or slightly ruffled, dark glossy green leaves and white, broad, and comparatively thick stems, is distinct from other chards and favoured by many because of its superior flavour. Rhubarb chard is a recently introduced strain in which the stems and midribs are bright crimson red. The leaves are ruffled, dark green, and have red veins. Besides being a good culinary variety it gives a very decorative effect to the home garden.

Winter Greens

Rich, well-drained, and well-worked soil is essential for the success of cabbage, cauliflower, and brussels sprouts. In the absence of farmyard manure or compost a mixture of blood and bone 3 parts, superphosphate 1 part, and sulphate of potash 1/20 part, all by weight, should be incorporated in the plant rows at the rate of ¼lb. to 4ft. of row. The fertiliser should be spread evenly along the plant rows and worked in or covered with sufficient soil so that the roots do not come into contact with a heavy concentration of fertiliser, which is liable to cause a check in growth.

Cabbage

Cabbage, one of the most widely used of all vegetables, may be grown the whole year round by selecting a suitable succession of varieties. Provided the soil is rich and properly prepared, the plant is most adaptable as regards conditions. Cabbage, as with most brassicas, must not be sown where it is to remain; young plants should be raised in seed-beds and planted out when large enough into their permanent position. Seed should be sown thinly ½in. deep in rows 6in. apart in a nursery bed, and when the plants are about 4 to 6in. high they may be set out 15in. apart in rows 2ft. to 2ft. 6in. apart.

Although cabbage is primarily a cool-weather vegetable, growth is greatly retarded during very cold weather, and heavy frosts will cause damage to mature heads of the more tender varieties such as the spring or pointed types.

In northern districts seed of early maturing varieties such as Henderson's Early Market, Golden Acre, or Enfield Market may be sown in February. Plants of these varieties set out in late February will be ready for harvesting in May. In the colder climates varieties of savoy and drumhead may be planted now.

Cauliflower

By planting a succession of cauliflower, this desirable vegetable may be harvested in most districts from the beginning of April to November. The principal essential to success in cauliflower growing is to keep the plants growing from the time the seeds germinate until the heads are formed; any severe check in growth may preclude the production of well-developed heads. Cauliflowers should be raised in a seed-bed and transplanted, allowing 2ft. between plants and 2ft. 6in. between rows.

During February seed of the following varieties may be sown: Phenomenal 5 Months, Main Crop Phenomenal (6 months to maturity), Walcheren, and Veitch's Autumn Giant. For earlier harvesting plants of Phenomenal Early should be set out this month.

Brussels Sprouts

Brussels sprouts is a difficult member of the cabbage family to grow successfully; for best results it requires a cool temperature and ample moisture when attaining maturity. Plants, which should be raised in a seed-bed, can be set out in February and March, allowing 2ft. between plants and 2ft. 6in. between rows. The sprouts should be ready to pull about 12 to 14 weeks later. As the sprouts keep on forming up the stem as the plant grows, harvesting may last 6 to 8 weeks.

Recommended varieties are: Champion, Fillbasket, and Scrymger's Giant.

Control of Pests and Diseases

A section dealing with common pests and diseases encountered in the home garden was begun in last month's "Journal." The following are other troubles with which home gardeners may be faced and the appropriate treatments:

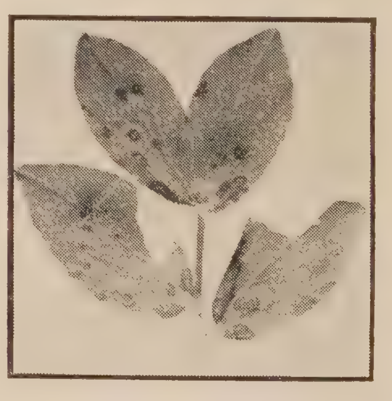
Asparagus

Phytophthora rot is the only disease of any significance which is likely to affect asparagus in the home garden. It appears as large semi-watery, light-brown lesions occurring on the sides of the shoots and sometimes encircling them about 1 to 2in. above the base. Shrivelling or collapse of the shoot follows severe infection. Under wet conditions a greyish-white, wet mould is evident on the surface of the larger lesions, but under dry conditions this may not be apparent.

Treatment: This soil fungus seldom causes damage except under excessively wet conditions. Good drainage and the removal of any affected shoots to prevent possible spread of the fungus spores should give a satisfactory control.

Broad Beans

Chocolate spot (*Botrytis cinerea*) is a fungous disease which can be found on broad beans almost any year. Severe infection will reduce the yield



[*R. Hughes photo.*

Chocolate spot on broad bean leaves.

seriously and may cause the death of the plant. The disease is usually prevalent in spring or early summer, appearing as chocolate-coloured spots up to ¼in. or more in diameter. They are more numerous on the upper surface of the leaves and are either superficial or extend to the lower surface. There may be streaks several inches long on the stems, and on the leaf stalks similar streaks may cause complete collapse of the leaf. The pods may also show brownish blemishes, and affected flowers will not set.

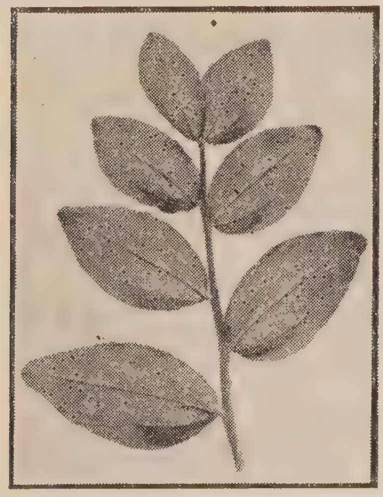
Treatment: The disease is less likely to be serious in ground well supplied with potash and phosphates. Adequate drainage is very important in preventing the occurrence of the disease. Beans should not be grown too thickly nor in a position which is too sheltered. Regular spraying at 14- to 18-day intervals with Bordeaux mixture 3:4:50 (4oz. of bluestone and 5¼oz. of hydrated lime to 4 gallons of water) or with a copper oxychloride mixture will control the disease. Generally it is not necessary to begin spraying until plants are forming flower pods.

Rust (*Uromyces fabae*) is a common disease of broad beans, but usually appears too late to cause any appreciable loss. This fungus appears as numerous, small, red pustules on the undersides of the leaves, and in severe infection the leaves may die or the green-leaf tissue may be so reduced that the plant is not able to manufacture sufficient food to set and develop pods.

Treatment: Where the disease reaches serious proportions spraying the plants at 14- to 18-day intervals with lime-sulphur 4¼ fl. oz. plus 1¼oz. of colloidal sulphur to 4 gallons of water is effective.

Black aphis (*Aphis rumicis*): The terminal shoots of the bean plant sometimes become infested by colonies of tiny dull-black insects with pale-coloured legs. These insects feed on the sap and cause terminals to wilt and become stunted.

Treatment: The application of nicotine sulphate, 1 fl. oz. (7 teaspoons) in 4 gallons of water to which 2oz. of soft soap or soap powder has been added will give satisfactory control. More than one application may be necessary. Nicotine sulphate to be effective when used alone must be used with an activator such as soft soap.

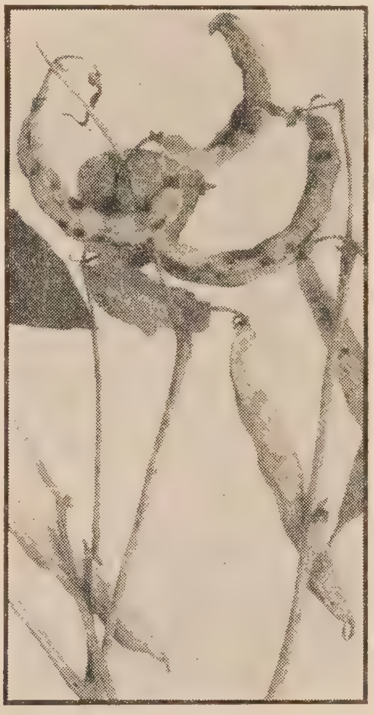


[*S. A. Rumsey photo.*

Rust on broad bean leaves.

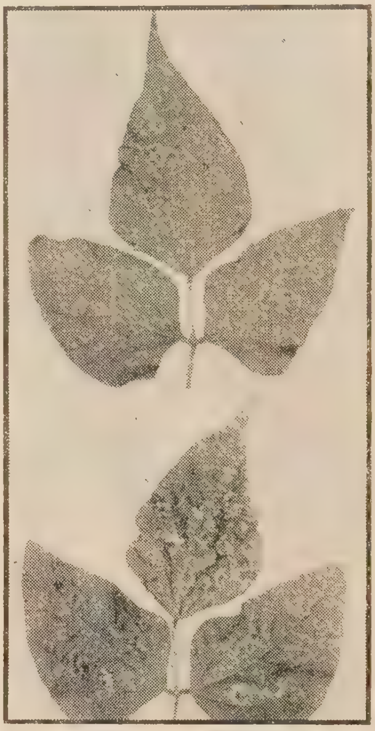
French Beans

Anthracnose (*Colletotrichum lindemuthianum*) is generally prevalent during wet, cool weather and, if not controlled, may cause complete loss of the crop. It is common in most districts and infection is more likely to occur during autumn. It affects the stems, leaves, and pods. On the stems it forms long, dark-brown, sunken cankers which may cause withering of the upper leaves. Leaf infection is followed by parts of the veins on the under surface of the leaves becoming reddish brown, and neighbouring parts of the leaves may shrivel up. On the pods small reddish spots are the first signs of infection and these become enlarged to circular depressions bordered with dark brown. The fungus often passes through the pods and attacks the seeds, producing dark spots on light-coloured seeds and less-prominent markings on dark-coloured ones. If unchecked, the disease may cause the loss of the whole crop.



Anthracnose disease on french bean plant, showing partial defoliation of plant and circular sunken areas on pods.

Treatment: As the disease may be seed borne it is important that good clean seed be used. The white-seeded varieties are highly resistant to anthracnose. The disease may be controlled by spraying every 14 to 18 days with Bordeaux mixture, 4oz. of bluestone and 5¼oz. of hydrated lime in 4 gallons of water, or with the certified copper oxychloride mixture. As the disease can be carried over in the soil from one season to another, refuse from a diseased crop should be carefully gathered and burnt.



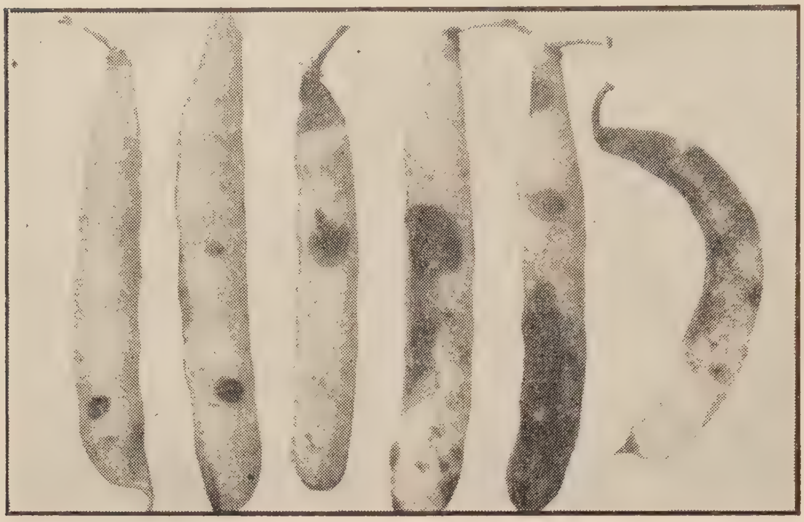
[*L. H. Wright photos.*

Halo blight on bean foliage. Upper—Foliage with semi-transparent, water-soaked spots about ⅛in. across, each surrounded by a wide, yellow halo. Lower—Same infection at a later stage.

Halo blight (*Pseudomonas medicaginis*) is a bacterial disease which is often a serious trouble, particularly from October to March. Early infection checks plants and reduces yields considerably. Affected plants show semi-transparent, water-soaked spots about ⅛in. across on the leaves, the spots being surrounded by a yellowish halo. Severe infection of the stems may be followed by wilting and death of the plant. Infection of the pods results in circular, water-soaked spots that gradually enlarge, forming irregular blotches with margins varying in colour from amber yellow to almost brick red. The bacteria often ooze from the centre of the spots and show as a greasy, yellowish slime. This forms a yellowish-brown crust on the surface as it dries. In severe cases the bacteria penetrate the pod and attack the seeds, usually causing small, irregular, yellow spots or blotches, and the whole seed may become shrivelled and yellow.

Treatment: As the disease may be carried by the seed, only clean seed should be used. Seed showing characteristic yellow stains should be destroyed. Diseased plants should be removed from the garden and destroyed as soon as they are noticed. A protective spray of Bordeaux or copper

PESTS AND DISEASES IN THE HOME GARDEN



Halo blight on bean pods. The circular, water-soaked spots gradually enlarge and form irregular blotches.

oxychloride as recommended for anthracnose should be applied every 14 to 18 days from the time the beans are through the ground. White-seeded dwarf varieties and runner varieties are highly resistant to halo blight.

Root Rot (*Fusarium* spp.): This is a soil-borne fungus which attacks the roots of beans and causes them to rot. The fungus causes sunken, reddish-brown lesions at the base of the stem, which then shrinks and causes the leaves to turn yellow and the bean pods to shrivel. The roots of affected plants are scanty and of a reddish colour. Young plants seldom survive an attack.

Treatment: The disease is very difficult to control. Crop rotation should be followed to avoid possible contamination carried over in the soil from a previous infected crop. Affected plants should be pulled up and burnt as soon as detected. Protective seed dressings such as copper carbonate, copper oxide (red or yellow), or copper oxychloride may discourage early infection of seeds and seedlings. Seed dusts were discussed in the garden notes in the December issue of the "Journal."

Sclerotinia disease (*Sclerotinia sclerotiorum*) sometimes attacks bean plants at the base of main stems or branches. A white fungous growth and characteristic, hard, black, resting bodies develop in the affected areas, causing the upper part of the plant to wilt. The same fungus also attacks carrots and lettuce and long rotations between these crops are recommended.

Treatment: All infected plants should be destroyed to reduce the number of sclerotia likely to be carried over in the soil.

Black Aphis (*Aphis rumicis*): Young tender shoots become infested by colonies of tiny, black, shining insects somewhat smaller than the head of a pin which cause wilting of the leaves and stunting of growth.

Treatment: Spray the plants with nicotine sulphate as recommended for black aphis on broad beans.

Soil Aphis (*Geoica phaseoli*) are greyish-yellow, globular, mealy insects about the size of a pin head. They attach themselves to the roots of bean plants and feed on the sap, causing the foliage to turn yellow. Severe attacks may cause wilting of the foliage followed by the death of the plant.

Treatment: Water the plant rows with a solution of nicotine sulphate 1 fl. oz. (7 teaspoons) in 4 gallons of water to which 2oz. of soft soap has been added.

Green Vegetable Bug (*Nezara viridula*): This bug will attack various vegetable plants, especially beans and tomatoes. The insect sucks the sap from the plant tissue, causing the young beans to turn yellow and shrivel; the older pods become tough and leathery. The adult is winged, but appears to fly only when disturbed and then only for a short distance. It is leaf green in colour, almost shield shaped, and ½ to ⅝in. long. It hibernates in the adult stage. It lays from 40 to 80 eggs in clusters on the foliage; they are pale yellow at first, but some change to reddish brown. The bug which emerges from the eggs is 1/16in. long and a bright orange colour with many dark-coloured spots. During their life bugs undergo many changes in development and colour, but until they reach the adult stage the dominant colour is black.

Treatment: Spraying the plants with D.D.T. 50 per cent. wettable powder, 1oz. to 4 gallons of water, has given some degree of control on bean crops. An egg parasite *Microphanurus basalis* is reported to be giving good control of the bug in Australia and a number of these parasites were recently liberated in parts of Northland and at New Plymouth and Te Kaha (near Opotiki).

Caterpillars: The so-called looper moth (*Plusia* spp.) caterpillar is the most common of a number of species of caterpillars that do damage in the home garden. They are up to 1½in. long and have a characteristic looping action when crawling.

Treatment: For the control of different caterpillars that attack beans sprays or dusts may be used. For spraying ½oz. of 50 per cent. D.D.T. wettable powder in 4 gallons water should be used. For dusting, a 2 per cent. D.D.T. powder will be found satisfactory.

Acknowledgment

Acknowledgment is made to the Plant Diseases Division of the Department of Scientific and Industrial Research for assistance in the preparation of the section dealing with diseases and their control and for supplying photographs.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during November and for the 4 months ended November 30, 1949, with comparative figures for the same month and 4-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

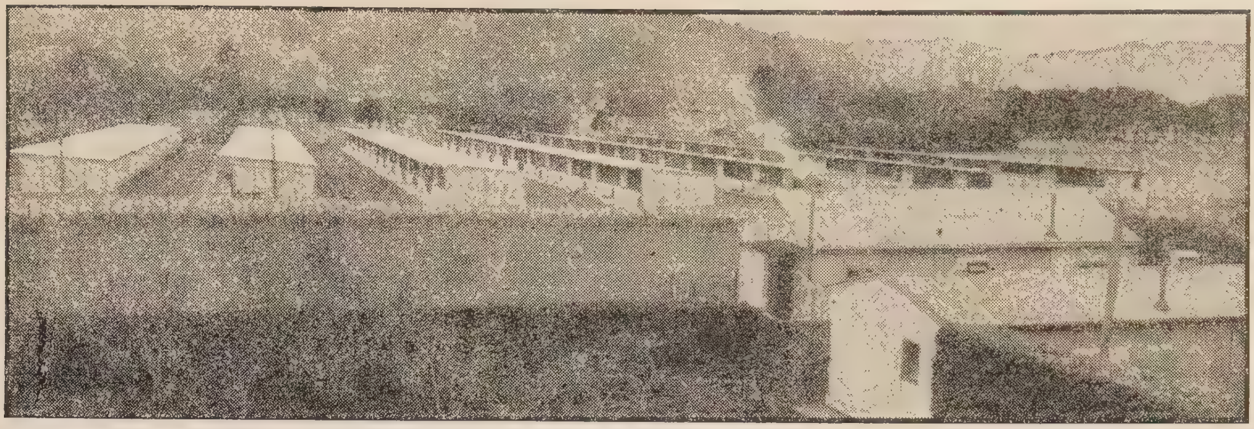
BUTTER—

Period	Creamery	Tons Whey	Total	Percentage Inc. or dec.	Tons Total in store at end of mth.
November, 1949	23,405	418	23,823	+7.456	33,374
November, 1948	21,800	370	22,170	—	21,250
Increase or decrease	+1,605	+48	+1,653	—	+12,124
For 4 months ended 30/11/49	68,688	1,150	69,838	+14.391	—
For 4 months ended 30/11/48	60,046	1,006	61,052	—	—
Increase or decrease	+8,642	+144	+8,786	—	—

CHEESE—

Period	White	Tons Coloured	Total	Percentage Inc. or dec.	Tons Total in store at end of mth.
November, 1949	12,112	3,403	15,515	+9.848	18,220
November, 1948	13,298	826	14,124	—	21,398
Increase or decrease	—1,186	+2,577	+1,391	—	—3,178
For 4 months ended 30/11/49	27,859	7,901	35,760	+9.703	—
For 4 months ended 30/11/48	31,599	998	32,597	—	—
Increase or decrease	—3,740	+6,903	+3,163	—	—

If these figures are converted into butterfat equivalent, there is an increase of 13.437 per cent. in butterfat graded for the 4 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.



Commercial Poultry Breeding Programmes

THE theory and practice of poultry breeding have been reviewed by F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, in a series of articles published since last April. This article completes the series with a review of breeding programmes suitable for adoption by poultry farmers interested in commercial egg production.

MOST laying birds in New Zealand are the progeny of mass-mated breeding pens. Mass mating is popular because it is a means of producing large numbers of day-old chicks with the minimum of labour and housing. Unfortunately, all too often greater attention is paid to the number of birds mated than to their quality. Many poultry producers restrict their mass-mated breeding policy to hens mated with cockerels; a smaller number use both pullets and hens mated with cockerels. For the most part males are selected with considerable care, but the selection of females is often less careful. Numbers are important when a cabinet incubator is to be filled and orders for day-old chicks met.

Limitations of Mass Mating

It can be claimed with considerable justification that the selection of breeders, male and female, on sight and handling has proved successful commercially. Furthermore, a programme of mass mating does result in progeny capable of reasonable and economic egg production if strict attention is paid to selection and numbers are not allowed to outweigh quality among the breeders. Some fluctuations in average egg production must be expected from year to year and, however careful the selection may be, progress toward greater production can be only slow and limited.

In other words, mass mating tends to maintain production rather than to increase it. The fact that a number of males are mated to a flock of females affords a reasonable chance of some sires producing progeny which tend to raise production: the progeny of other and poorer males may have the opposite effect. Fluctuations in average annual production depend on the proportion of good and poor males.

Unfortunately, handling and observation do not permit the breeder to distinguish between males with good and poor powers of transmitting fecundity to their progeny. That is one of the limitations of mass mating Also, there is no practical means of checking hatchability, livability, or production factors in the progeny of any one male or female.

Introducing Fresh Blood

The successful introduction of fresh blood presents another interesting aspect of the mass-mating system of breeding. Many poultry producers are concernd with this problem and frequently attempt to bring in new blood when it is not necessary. Mass mating does not tend toward close relationship among the birds of a flock. Though the introduction of male birds from a wholly unrelated strain may result in additional vigour in the progeny, it also offers an increased risk of variation in egg production, type, and livability.

Probably the safest method of introducing fresh blood is by mating one or more bought-in cockerels to a flock of selected hens. The progeny, both male and female, may be carefully observed before half-bred or quarter-bred males are used on the main flock. Some breeders prefer to introduce new blood by bringing in females for mating with carefully selected males, the progeny of any such mating being observed before males are bred for use on the main flock.

Progeny Testing

Most breeders of poultry with a sound knowledge of breeding will concede that progress in average egg production can be made within a reasonable period only by resorting to at least some progeny testing. Furthermore, average egg production is not the only factor of importance in the economy of a farm: Hatchability must be considered, but above all is the livability of the progeny at all ages. The real value of a bird, male or female, as a breeder can be measured only by the kind of progeny it produces in terms of production and livability. To make progress breeding stock must be selected on this basis. That means the expenditure of time, patience, and labour, but it also means increased returns ultimately.

The extent to which progeny testing can be carried out varies with the facilities available and the breeder's ability to give the necessary time to the work. In the past pedigree breeders have relied on the selection of cockerels bred from hens of known high production mated to females with high records in their pullet year. Experience has shown in many instances that mating on this basis has not led to increased egg production in the progeny. Cockerels from heavily producing dams and hens with high records behind them do not necessarily throw high-producing progeny. Each has to be tested as a breeder before its true worth can be assessed.

Simple Testing System

The question then arises of how progeny testing can be carried out when labour costs are high. While the main replacement programme and sales of day-old chicks may be kept going by a policy of mass mating, a start may be made by progeny testing a limited number of males. To do this single male-bird breeding pens are required, and a number of cockerels must be selected for mating to teams or pens of hens. The hens in each pen (15 for a light-breed male and 10 for a heavy-breed male) should be similar in quality, as it is the males which are under test. From each single-male-bird mating it should be possible to raise sufficient pullets for a random sample of 50 birds to be taken for testing for egg production and livability. Eggs from each mating must be kept separate at hatching time and the resultant chicks toe punched to distinguish them. No undue amount

HEADING PHOTOGRAPH: The long laying houses are those set aside for the breeders' laying trial at the Poultry Demonstration Plant, Upper Hutt. Photo News Ltd. photo.

of work is involved in keeping data about hatchability of the eggs from each pen and the mortality among the progeny from each pen.

The random sample of 50 pullets bred from each cockerel under test is then placed in a laying pen suitable for such a flock. Daily egg production is recorded for, say, 44 or 48 weeks and the flock or hen-house average obtained (total eggs laid divided by the number of pullets started with). A record is kept of all mortality and the cause of death noted in each case if possible.

From the information collected in this way it is possible to compare the cockerels under test and estimate whether each male is above or below the average for all the males tested. Males which are significantly above the average on this assessment of breeding value may be used again the following year, mated to the best females available, while the brothers of the pullets which were retained for measuring egg production and livability should be used for mass mating; the best may be placed under test as males in the following breeding season.

By this comparatively simple system, which does not involve even trap nesting, males above the average are retained and their sons used. Egg production of the pullets from any male under test and their livability between, say, December or January and the following June will give sufficient indication of whether their brothers should be used for mating.

The plan may be summarised as follows: From the progeny of a cockerel mated to a group of hens the best cockerels are retained and a random sample of 50 pullets tested for egg production and livability; if hatchability, rearability, egg production, and livability between December and June are significantly above the average for all the males under test, the best of the cockerels retained may be used for progeny testing and the others used for mass mating.

The desirability of selecting a random sample of pullets from each mating must be stressed. Culling, except for sickness, should not be practised, as strict and normal economic culling prevents accurate assessment of the value of each male through his progeny

The programme outlined may be varied by mating the cockerels set aside for testing to selected pullets. Male birds found to be above the average and therefore worth retention for another breeding season may then be mated to the best hens available on the farm. The progeny thus produced, male and female, should be of value in the programme for stock inmprovement.

Cockerels which fail to exceed the average should be discarded, as should their sons. If pullets are used for testing cockerels, it is recommended that all male progeny be discarded at a day old and the pullets retained for egg production only.

Testing Female Birds

If a breeder has the labour and facilities for undertaking a more advanced programme of breeding, the next stage is to progeny test the females as well as the males. This involves the keeping of more detailed records and the use of trap nesting.

As a start it is desirable to trap nest a flock of pullets for a season with a view to selecting on egg record, as well as by observation and handling, the best birds for use as breeders when they are yearling hens. These are mated to a male bird which has been progeny tested as a cockerel. During the hatching season a complete record is kept of the hatchability of the eggs of each hen mated. For this purpose the hens must be trap nested and each egg marked with the hen's ring number. The eggs from each hen are then hatched separately in the incubator by the use of wire hatching cages or muslin bags. The chicks from each hen's eggs are toe punched to denote the hen from which they came. This involves a very complicated toe-punch system, and the use of wing bands instead of toe punching for identification is worth consideration. The pullet chicks so marked are later trap nested to determine their annual egg production.

Thus the following data are collected for each hen mated: Hatchability of eggs; livability of the chicks, male and female; annual egg production of each pullet; and livability of the adult pullets.

This builds up a complete family history for the progeny of the hens tested. From this information the families which give the best average egg production and the lowest mortality at all stages may be selected. Obviously, the male progeny (full brothers to the pullets) of hens which show a satisfactory family history are of value for breeding. Unsatisfactory families—the hen and her progeny, male and female—are discarded from any future progeny-testing or breeding programme.

Considerable work is involved in a complete progeny-testing programme of this nature, but limited numbers may be tested and a valuable nucleus of basic stock built up. It is essentially a programme for the breeder who wishes to build up a flock of high-producing birds. Breeding factors such as high hatchability, lack of broodiness, winter egg production, persistency and resistance to disease (low mortality) can be studied under such a programme.

Breeders' Laying Trial

Facilities are now being offered by the Department of Agriculture for a breeders' laying trial at the Poultry Demonstration Plant, Upper Hutt. This trial is designed to test 20 pullets in each pen and is not intended to be on a competitive basis, as in the main laying trials of the past have been. A breeder may elect to send 20 half sisters—the female progeny of one male under test—and so obtain data about the breeding value of the cockerel. Alternatively, a breeder may elect to send, say, 4 or 5 pullets which are full sisters from each of 5 or 6 hens and so obtain information about the breeding value of selected females. These facilities will be of value to breeders who may not wish to trap nest or lack the time or facilities for trap nesting on the farm.

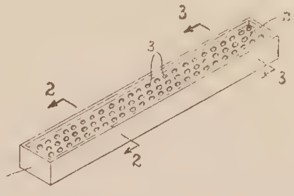
This trial has been established to help poultry producers who are interested in breeding and wish to test stock. Forty-six pens will be available in 1950 and it is hoped that breeders will make use of the facilities offered.

◆

Recent Patent Specifications for Farming Inventions

The following particulars of recent patent applications of interest to farmers have been selected from the Patent Office Journal, October, 1949, issue and are published by permission of the Commissioner of Patents, Wellington. Photostat copies of any specifications will be supplied for a small fee on application to the Patent Office.

No.	Description.	Applicant.
97111	Top-plate for Poultry Feed Container,	Maurice Augustine Sanders.



A poultry-feed container 1, after having been filled with feed, receives an apertured plate 2 overlying such feed and loosely fitting on top of it within the container. The feed is pecked out of apertures 3 by the birds, thus gradually reducing the food level, as a result of which the plate slides down also.

No.	Description.	Applicant.
91453	Implement for Lifting Nursery Trees,	F. S. Mason.
93776	Tube for Seed-drill,	J. E. Holland.
93963	Gate Hinge,	D. S. Hitchison.
94142	Cream Separator Clutch,	C. J. Western.
94586	Blade-sharpening Attachment for Lawnmowers,	J. R. Morris.
94999	Gate Hinge,	D. S. Redward.
95557	Germicidal Composition.	Imperial Chemical Industries (Australia and New Zealand).
96187	Automatic Overload Disconnector for Shearing Machine,	R. H. Lister and Co.
96352	Quick Freezing of Foodstuffs,	The Union Cold Storage Co. Ltd.
96948	Apple Coring Knife,	G. T. Pender and A. J. Corrigan.

FARMING IN NEW ZEALAND

HEADING PHOTOGRAPH: The port of Napier, the port for the Hawkes Bay district. N.Z. Aerial Mapping Ltd. photo.

Hawkes Bay

ENDOWED with an adequate rainfall, long hours of sunshine, and suitable soils, Hawkes Bay has proved to be the healthiest district in New Zealand for sheep, and consequently it has developed into one of the Dominion's major sheep areas. Of the total number of breeding ewes in the Dominion approximately 13 per cent. are in the district, and 12 per cent. of the lambs killed for export pass through its three freezing works. The climate has also been responsible largely for the development of an important fruit industry until today a considerable portion of the apples and stone fruits grown commercially in the Dominion come from the Heretaunga Plains, the largest area of flat land in the district. This review by R. P. Hill, Fields Instructor, Department of Agriculture, Hastings, describes the production and potentialities of the district.

THE Hawkes Bay Land District is some 4300 square miles in area and is situated on the south-east portion of the North Island. Bounded on the west by the Ruahine, Kaweka, and Ahimanawa Ranges and on the east by the South Pacific Ocean, it trends north-north-east from a line between the Manawatu Gorge and Cape Turnagain to Wairoa and Mahia Peninsula. It is about 40 miles wide and approximately 110 long, but these distances give no indication of accessibility; the distance, for example, from south-west to north-east by rail is 200 miles.

In October, 1769, Captain Cook in the Endeavour sailed along the coast of Hawkes Bay and named many of the landmarks, but did not go ashore. At that time, judging by the number of settlements which he noted, the Maori population appeared to be quite extensive. In 1773 he again visited the locality in the Resolution, but again did not land. From then onward whalers appear to have established whaling stations at various points and by 1848 a number were operating. Settlement of the district by men who proposed to farm the land began about this time and in 1850 the purchase of land from the Maoris was legalised.

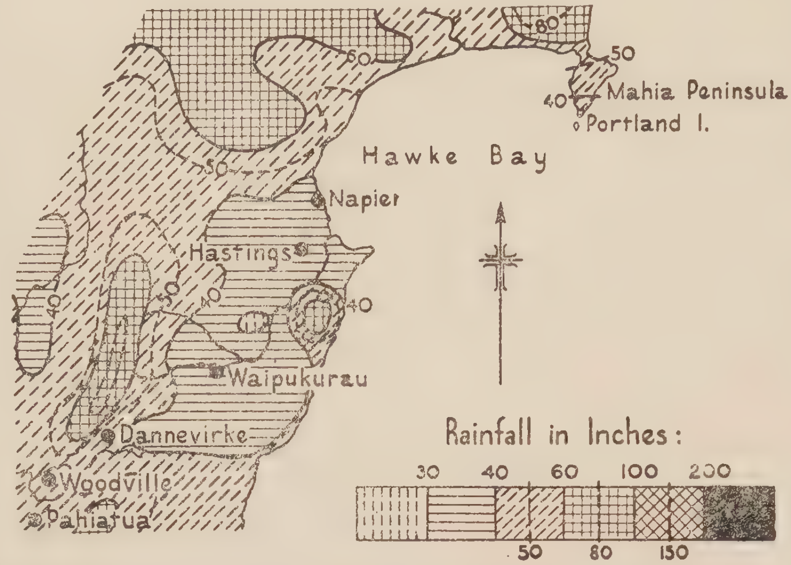
The main native cover was bracken fern, and in the west native forest, with some small areas of native grasses. The Ruataniwha Plains, Waipukurau, and the coastal areas first attracted attention for sheep raising and almost simultaneously wheat, barley, potatoes, and maize were grown on flat fertile areas both by Maori and pakeha for supply to Wellington and for feeding the British troops. By 1864 the fertile Heretaunga Plains were being settled. The early graziers appear to have run Merino sheep and it was not until the late 1860's that longwool sheep (Lincoln and English Leicesters) were introduced.

With the advent of the freezing works in 1883 and the opening of the railway to Wellington in the early nineties the export of fat sheep became possible and the breeding of fat lambs for export began; the Romney sheep was by then the dominant breed and the Romney cross has continued so until the present day. Dairying for butterfat production began in 1892 with the opening of the Heretaunga Butter Factory and other factories were established in northern and southern Hawkes Bay. But the district is essentially a wool- and meat-producing one, with numerous flocks and herds of stud sheep and cattle. Dairying takes second place followed by fruit growing, seed growing, market gardening, and vineyards, with a variable amount of grain growing.

Climate

The word sunny has become synonymous with Hawkes Bay and this is not inappropriate, for Napier, the chief town, has one of the highest records in New Zealand for hours of bright sunshine in a year, the average over a period of nearly 40 years being 2416 hours. The large amount of sunshine in the district is due principally to its protection by the mountain ranges from the westerly winds and there is also a certain amount of protection from the southerlies. Neither northern nor southern Hawkes Bay has such high recordings for hours of sunshine, but nevertheless they are ahead of many other parts of the Dominion.

ANNUAL RAINFALL IN HAWKES BAY



Map drawn by Head Office, Department of Lands and Survey, Wellington.

Rainfall

In northern Hawkes Bay along the coastal sector the annual rainfall is generally above 40in. and this increases as one goes inland, and along the ranges it reaches 70 to 100in. South of Napier on the coastal hills most of the area has approximately 40in. per annum, but a small section around Mt. Kauranaki receives over 70in. Further westward on the plains and lower rolling country the annual fall is less than 40in., but rainfall again increases toward the main ranges until, on their summits, it exceeds 80in.

TABLE 1—MEAN ANNUAL RAINFALL

	In.		In.
Wairoa ..	48.43	Hastings ..	31.84
Tutira ..	54.32	Waipukurau	32.49
Eskdale ..	41.68	Dannevirke ..	44.02
Napier ..	32.27	Woodville ..	51.12

Though the monthly distribution of rainfall is generally fairly even, in spring falls are often light and infrequent and they are again often light and unreliable in February and March.

A feature of rainfall data for Hawkes Bay is the very wide deviation from the average monthly figure, and this at times has been reflected in disastrous floods and, at the other extreme, drought conditions.

For instance, at Eskdale, some 12 miles north of Napier, the mean rainfall for the month of March is 3.17 in., but as much as 22.55in. and as little as 0.18in. have been recorded.

The unreliability of the rainfall in the spring and summer has a considerable short run influence on farming practices. A very dry summer results in parched pastures and sometimes necessitates the shifting of some cattle to areas west of the ranges in the Manawatu and Rangitikei districts.

Temperature

The range of mean temperature on the coastal areas is approximately 18 degrees; Napier has a mean temperature of 65.5 for the month of January and 46.8 for July. Further inland the range is greater, summer temperatures sometimes exceeding 90 degrees and frosts being common in winter. Where winter conditions are more severe pasture growth is checked and the provision of winter supplementary feed is essential.

Humidity

Data on humidity are not available for many places in Hawkes Bay. The mean relative humidity for Hastings is low for a North Island town and this is of particular importance to the orchard and market gardening industries in the vicinity, as it facilitates the control of fungous diseases. It is also of value in the production of pasture seed on the Heretaunga Plains, as dry atmospheric conditions are important at harvesting time.

Winds

Dry north to west winds, which come across the land mass of the North Island, are frequent in spring and summer and this is a cause of dry conditions setting in earlier than in most other districts.

Generally the climate is very suitable to pasture growth, except that there is usually a check to growth in summer and winter. The long hours of sunshine and the low relative humidity have been some of the contributing factors to the suitability of the area around Hastings as an orchard area for pip and stone fruits and to the growing of market garden crops. Late frosts in October and November sometimes cause damage, but on the whole loss from these is not great and not frequent.

Topography

Most of the Hawkes Bay Land District consists of hilly and steep country interspersed with areas of flat country. The district may be classified broadly into three main topographical units.

The western ranges and foothills.
A middle valley lowland.
Coastal hill country.

Western Ranges and Foothills

The western ranges from north to south comprise the Maungaharuru, Ahimanawa, Kaweka, and Ruahine Ranges, the Maungaharurus being situated east of the Ahimanawas. East of the Kawekas lies the Birch Range, where the ranges and hills are separated by plateau areas with an elevation of 1800ft. to 3000ft. These plateaux are dissected by deep gorges. To the east of the Ruahines and separated from them by a narrow depression is the Wakarara Range.

The main ranges, consisting of greywacke and argillite, vary in height from 3000ft. to 4000ft. and in places rise to over 5000ft. Rolling to steep foothills lie to the east of the western ranges and some extend for a considerable distance into the district.

The main rivers of Hawkes Bay have their source in the western ranges. In the north the Mohaka and Esk flow from the ranges through the lower coastal hills to the sea. In central Hawkes Bay the Tutaekuri, Ngaruroro, and Tukituki flow across the Heretaunga Plains, the first two having their source in the Kawekas and the last in the Ruahines. In the south the Manawatu flows southward from the Ruahines until it turns west through the gorge to flow out into the Tasman Sea.

Middle Valley Lowland

Between the western ranges and the coastal hills is situated what may be termed a valley lowland, which extends at an elevation of under 1000ft. from the southern boundary of the district to Hawke Bay.

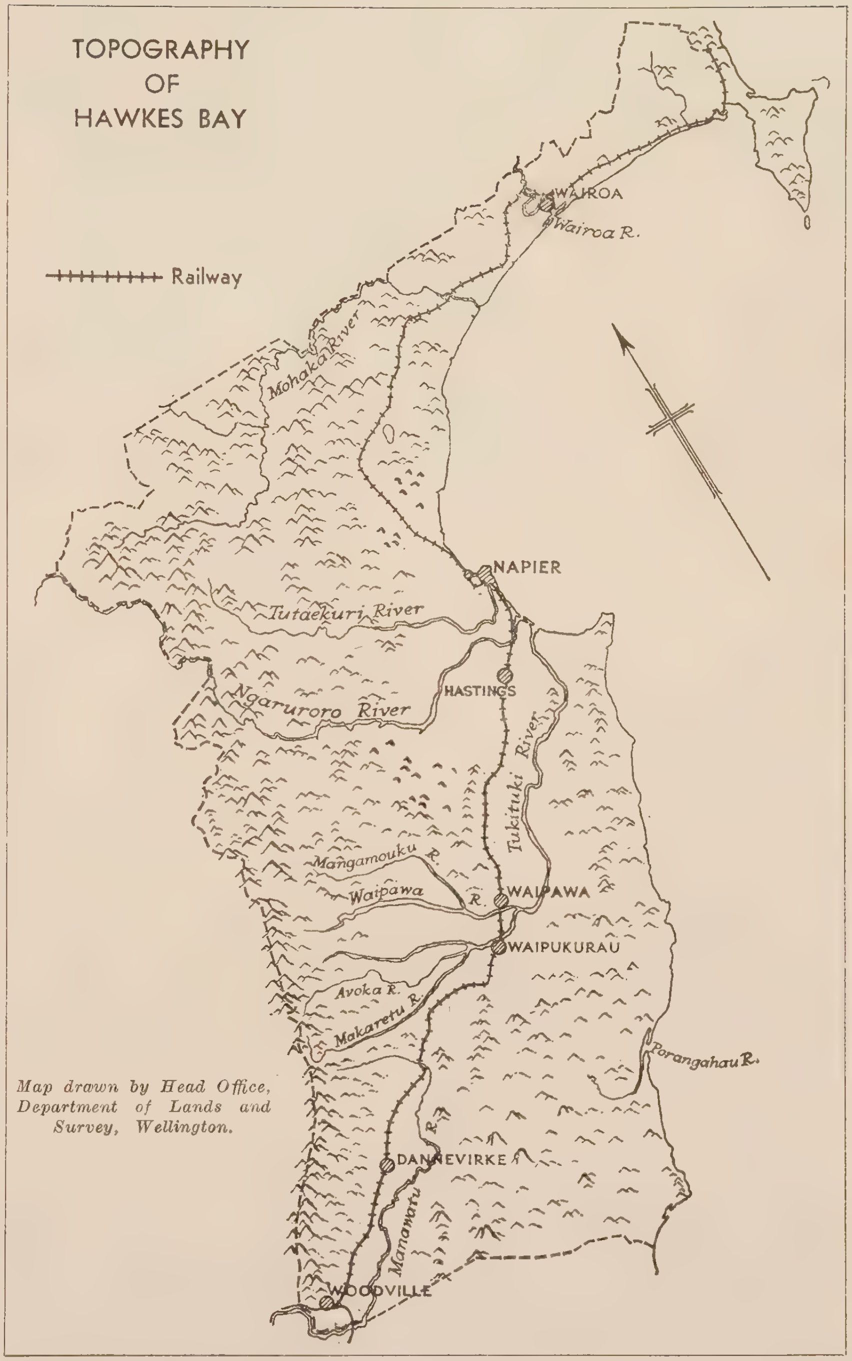
The principal areas of this lowland are:—

The Heretaunga Plains.
The Takapau-Ruataniwha Plains.
The Upper Manawatu basin.

The Heretaunga Plains, centred on Hastings, together with the raised bed of the Ahuriri Lagoon occupy an area of approximately 85,000 acres. The plains are the result of the infilling with alluvial sediments of a structural depression in the form of a sea basin. The sediments, which consist of sands, silts, clays and shingle derived from the greywacke and argillite rocks and volcanic ash from the western ranges, were deposited by the Ngaruroro principally, Tutaekuri, and Tukituki Rivers.

The Takapau-Ruataniwha Plains: The gravel-filled basin west of Waipawa and Waipukurau forms the Takapau-Ruataniwha Plains and covers an area of approximately 64,000 acres. Sandy silts, silts, clays, and greywacke shingle have been deposited by the Waipawa and Tukituki Rivers and the tributaries which flow into them west of Waipawa and Waipukurau to form the plains.

Broad terraces of greywacke shingle underlying a sandy silt occur to the west of the plains and increase progressively westward to a height of several hundred feet above the local stream level.



Map drawn by Head Office, Department of Lands and Survey, Wellington.

The upper Manawatu basin: Extensive areas of low terrace about and north of Dannevirke and river flats following the Manawatu River to the Manawatu Gorge form the lowland area in the Manawatu basin.

Coastal Hill Country

The coastal hill country of Hawkes Bay is divided by the Heretaunga Plains. In the northern coastal hill section, which extends to the northern boundary of the district, the topography is extremely variable. From a height of approximately 1000ft. inland there is a gradual loss of elevation coastward. Streams and rivers are deeply entrenched in gorges, and the larger rivers widen near the coast and have well developed terraces bordering them. Steep, rolling, and ploughable country occur at different elevations.

The southern section of coastal hill country extends from Cape Kidnappers to the southern boundary of the district and consists of a series of ridges, separated by broad valleys, with a north-east, south-west trend. Most of this country lies below 1000ft., but in places rises to peaks of over 2000ft.

Much of the area is limestone country and it is regarded as the healthiest sheep country in the Dominion.

In the extreme south lie the Waewaepa and Puketoi Ranges, the former of greywacke and argillite and the latter of mudstones and sandstones. In this area the country is steep and rugged, but it becomes more rolling northward in hills of mudstones and sandstones, with steeper slopes near the coast.

Soils

The soils of Hawkes Bay (see map on page 18) may be grouped as follows:

Yellow grey earths: Weakly leached (1a); weakly leached, plus limestone soils (1b); moderately leached (1c).

Yellow brown earths: Weakly leached (2a); moderately to strongly leached (2b); transitional between yellow grey and yellow brown earths (2c).

Yellow brown pumice soils: Moderately leached (3).

Yellow brown loams: Weakly to moderately leached (4a); Weakly to moderately leached, shallow on gravel (4b); weakly to moderately leached—lighter rainfall types (4c); strongly leached (4d).

Recent soils from alluvium (5).

Saline soils (6).

Skeletal soils on steep slopes: Skeletal brown earths moderately weathered (7a); skeletal brown earths slightly weathered (7b); skeletal grey earths (7c); Skeletal yellow brown pumice soil (7d).

Yellow Grey Earths

In the area extending from the Matapiro district and Napier to slightly south of Waipukurau, where the annual rainfall is less than 40in., the soils are classified as yellow grey earths. They are formed on muddy sandstones and mudstones which contain lime and are characterised by grey colours and by fairly heavy subsoil which in a number of types are cemented to a rock-like hard pan. Their natural fertility is good and persists for a long time under grassland without topdressing, despite a phosphate deficiency. The native vegetation in places on these soils was coastal forest, but large areas were under bracken fern when settlement began and the nature of the vegetation that preceded the bracken is not known. On these soils are located the major fat lamb areas in the district.

Yellow Brown Earths.

In south-eastern Hawkes Bay, where the rainfall is heavier, are the yellow brown earths. These are characterised by yellowish colours in the subsoil. There is no hard pan, but the subsoil may be compact and clayey. The soils have lost some lime from the topsoil by leaching, but are mostly fertile, although there are a few types with low natural fertility. However, all the soils respond to phosphatic topdressing and are well adapted to sheep farming.

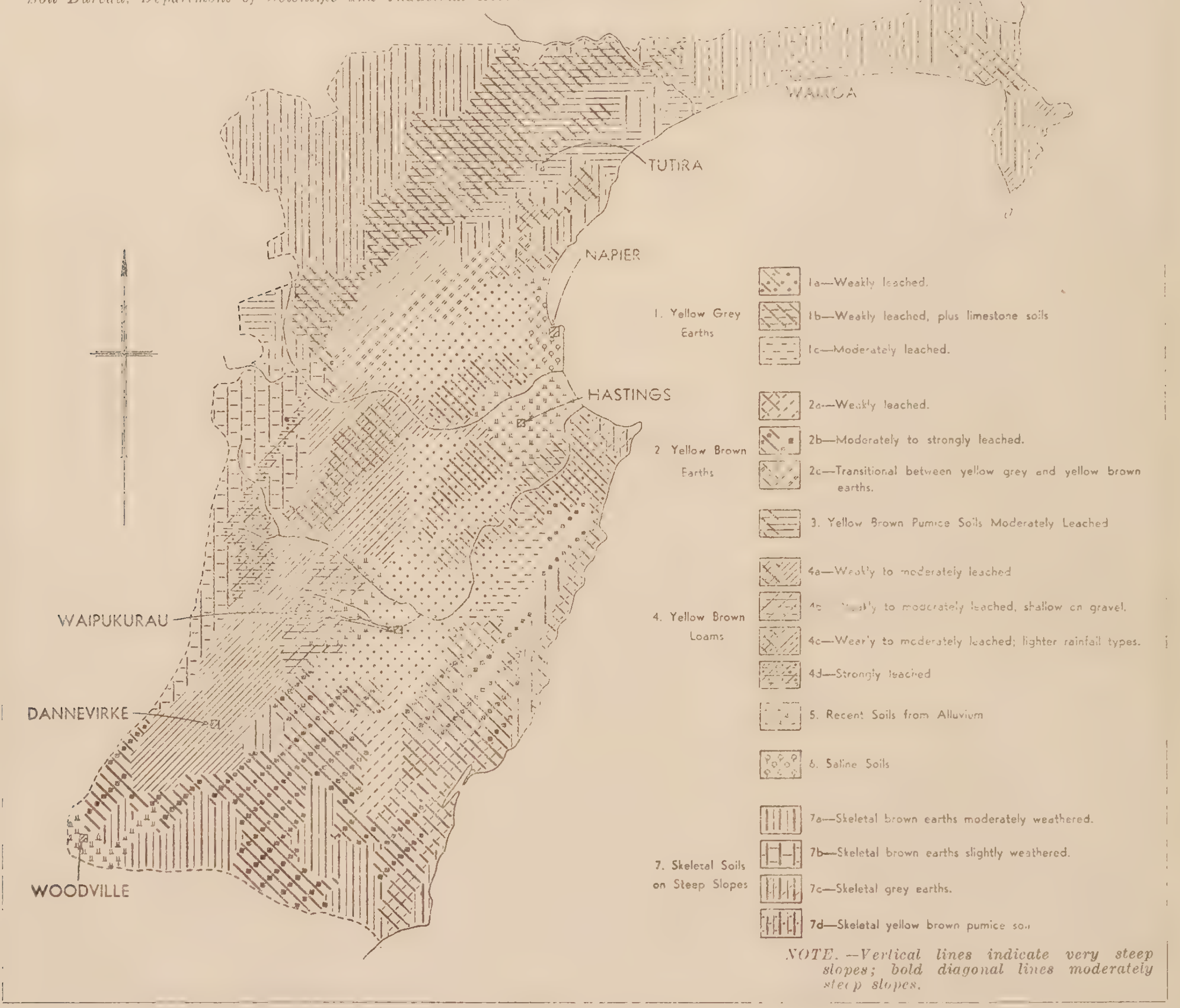
Yellow Brown Pumice Soils

In the north and north-west, where annual rainfall is over 50in., the soils are classified as yellow brown pumice soils. They are light, fluffy pumice soils formed on volcanic ash. The

SOIL TYPES OF THE HAWKES BAY DISTRICT

SOILS OF HAWKES BAY

Adapted from genetic soil map of New Zealand, prepared by the Soil Bureau, Department of Scientific and Industrial Research.


WAIROA
TUTIRA
NAPIER
HASTINGS
WAIPUKURAU
DANNEVIRKE
WOODVILLE
1. Yellow Grey Earths
1a—Weakly leached.
1b—Weakly leached, plus limestone soils
1c—Moderately leached.
2 Yellow Brown Earths
2a—Weakly leached.
2b—Moderately to strongly leached.
2c—Transitional between yellow grey and yellow brown earths.
3. Yellow Brown Pumice Soils Moderately Leached
4. Yellow Brown Loams
4a—Weakly to moderately leached
4b—Weakly to moderately leached, shallow on gravel.
4c—Weakly to moderately leached; lighter rainfall types.
4d—Strongly leached
5. Recent Soils from Alluvium
6. Saline Soils
7. Skeletal Soils on Steep Slopes
7a—Skeletal brown earths moderately weathered.
7b—Skeletal brown earths slightly weathered.
7c—Skeletal grey earths.
7d—Skeletal yellow brown pumice soil

NOTE.—Vertical lines indicate very steep slopes; bold diagonal lines moderately steep slopes.

ranges and elevated country of the west are thickly coated with Taupo pumice, but further east the coating thins and runs out, and an older ash shower (Gisborne pumice) occurs and forms the soil of the easier country north and west of Tutira. The natural fertility of both the Taupo and Gisborne pumice soils is low where the native cover was fern and scrub, but is higher where the cover was forest. Near the coast and on the steep slopes further west the pumice cover is thin and the soils have a higher natural fertility. The pumice soils are susceptible to blowing where the vegetation is disturbed and particularly while under cultivation.

Yellow Brown Loams

Light soils classified as the yellow brown loam group are located in the west of the district south of the Ngaruroro River in the area where the annual rainfall ranges from 40 to over 70in. as the west of the section is approached. They are formed on pumiceous muddy sandstones and on silts and stony deposits derived from a mixture of volcanic ash and greywacke. Their natural fertility is low where the native cover was fern and scrub but is higher where they were under forest. In the latter case the fertility is transient and after about 20 years deteriorates sharply if it has not been maintained by phosphatic topdressing. The soils are susceptible to blowing while under cultivation. In the southwestern section of this soil group area is the main dairying part of Hawkes Bay.

Recent Soils from Alluvium

Recent soils of alluvial origin occur throughout the district, the main areas being the Wairoa flats, the Heretaunga Plains, the eastern portion of the Takapau-Ruataniwha Plains, and the Woodville flats, together with numerous other small flats bordering streams and rivers.

The most important area of recent soils is the Heretaunga Plains, the soils of which are widely known for their high natural fertility. They are formed on river-deposited clays and sands. Some types show little response to superphosphate. The soils contain a high percentage of lime, but nevertheless some lime is applied. Drainage is the chief factor limiting the production of deep rooted crops on the recent soils, though for shallow rooted crops such as grass, a high water table is advantageous under the prevailing low rainfall.

Saline Soils

The former Ahuriri Lagoon, which was raised 5 to 8 feet above its former level as a result of the earthquake of February 3, 1931, is the only area of saline soils in the district. A more detailed description of this area is given later in the article.

Land Utilisation

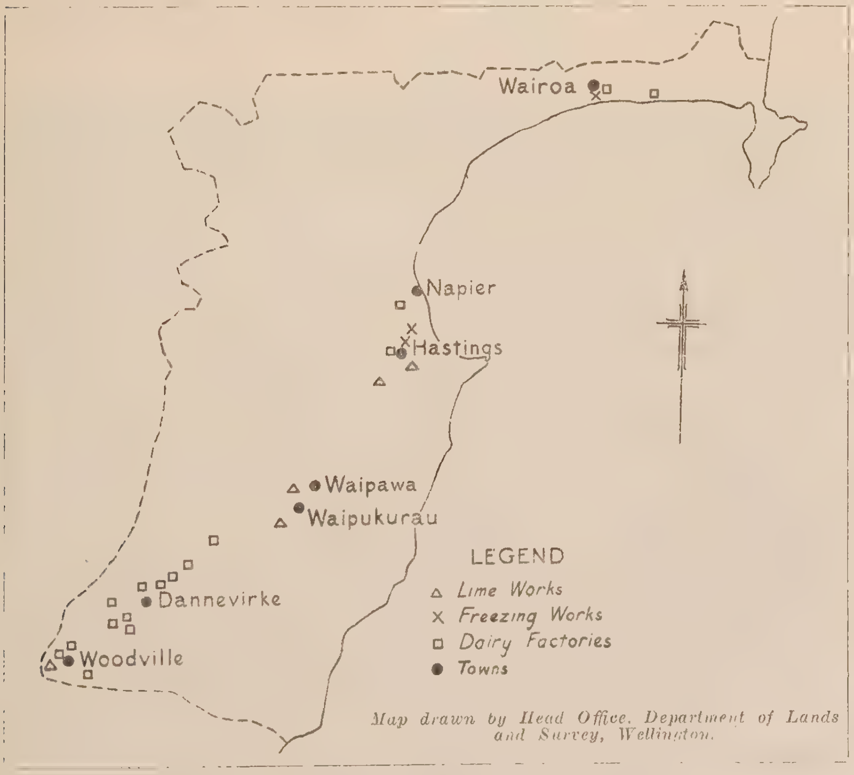
The area in sown pastures comprises approximately two-thirds of the occupied area and it is on this and the areas in tussock, fern, scrub, and second growth that the district grazes its 4,300,000 sheep (13% of the total sheep in the Dominion) and 381,000 head of cattle, of which 49,000 are dairy cows in milk. The barren and unproductive land consists of bare mountain tops, and native bush areas on the slopes of the main ranges. The growing of grain and pulse crops is relatively unimportant, and of the 9000 acres grown 63% is used for fodder purposes. Some 42,000 acres are devoted to the growing of green fodder and root crops and of this chou moellier for supplementary winter feed occupies nearly 20,000 acres.

Apart from the area on the Heretaunga Plains devoted to orchards and specialised crops land is utilised for grazing animals, to produce meat, wool, and some dairy produce, the latter coming mainly from the southern part of the district.

TABLE 2—LAND UTILISATION IN HAWKES BAY, 1946-47

	*Acres
Total area	2,795,000
Area occupied	2,778,000
Tussock and other native grasses ..	399,000
Native bush	97,000
Fern, scrub, and second growth ..	257,000
Barren and unproductive	38,000
Area in grasses, clovers, and lucerne	1,911,000
Green fodder and root crops ..	44,000
Grain and pulse crops	9,000
Plantations for timber and shelter ..	11,000
Orchards and market gardens ..	5,000
Private gardens and nurseries ..	5,000
Fallow land	2,000

* Figures are to nearest thousand.



Map drawn by Head Office, Department of Lands and Survey, Wellington.

[*N.Z. Aerial Mapping Ltd. photo.*

Hawkes Bay Rivers Board work on Tutaekuri and Ngaruroro Rivers, showing the overflow channel in the centre of the illustration.

Types of Farming

Though Hawkes Bay is predominantly a sheep-farming area, variations in topography, climate, and soils have made for diversity in certain areas. Because of these variations, a simple classification of types of farming is not possible, but the following is a broad outline:—

Sheep Farming (Wool and Store Sheep)

On the higher country along the western ranges on a considerable portion of the hill country of northern Hawkes Bay and on the hill country on the south-east coast, store sheep farming predominates. Here Romney cross ewes are mated with Romney rams and the practice is to retain ewe lambs for flock replacements, fatten a few wether lambs, and dispose of the remaining wether lambs as stores for fattening on rape and chou moellier crops in other districts. Cattle are run, and breeding cows, both Hereford and Aberdeen Angus, are carried in conjunction with sheep. The ratio of cattle to sheep is approximately 1 cattle beast to 10 sheep shorn, although in the northern part of Hawkes Bay approximately 13.4 head of cattle per 100 sheep shorn are now carried, against 8.0 in 1920. In this area there has been some reversion to scrub and blackberry and cattle are used for control purposes. Of the two breeds the Aberdeen Angus predominates. In-calf beasts are sometimes sold to fattening farms but usually the calves are sold at weaning time and the cows retained for further breeding. If too old, they are fattened and sent to the freezing works.

The dominant pasture species on this store sheep country are browntop and danthonia. Management practices differ in various sections of the area; in the northern portion and the south-east section not much supplementary winter fodder is provided, but on the areas closer to the main ranges to the west, due to the severer winters, the provision of winter fodder (usually chou moellier) is essential. Some of the sheep stations have flats of high-producing pastures, which provide a reservoir of feed to tide over times when there are shortages on the hills.

On some of the more inaccessible yet easier hill country there are what might be termed intermediate farms, that is, farms where it is possible to fatten a proportion of the lambs. On most of this country it is possible to top dress with fertilisers, and the pastures contain some perennial ryegrass, subterranean clover, and white

The hill country to the south of Napier is some of the best sheep country in New Zealand.

clover. Though the major portion of the farm revenue is derived from the sale of wool and store sheep and cattle, a proportion comes from the sale of fat lambs. Southdown rams are mated with the older ewes and the lambs are sold as fat, but Romney rams are mated with the younger ewes, the ewe lambs being retained for flock replacements, and the wether lambs sold, fattened on rape, or held and fattened as 2-tooth wethers. The ewe lambs that are held for replacements are culled as 2-tooths, sufficient being retained to maintain the flock. The remainder are sold, generally at the autumn ewe fairs.

These store and intermediate sheep farms play an important part in the economy of the sheep industry in the North Island, for they are one of the reservoirs from which the fat lamb producers of Hawkes Bay, the Manawatu, and the Waikato obtain some of their flock replacements.

Sheep Farming (Lamb, Mutton, and Wool)

Sheep farming in which the products are lamb, mutton, and wool is undoubtedly the most important type of farming in Hawkes Bay and the perimeter of the area devoted to it is gradually extending on to the store sheep country as pastures are improved.

This significant change in the production of fat lambs is illustrated by the increased proportion of breeding ewes in the district. In 1920 the percentage of breeding ewes to total sheep was 43.2; in 1947 it had reached 64.6. Total sheep in the period increased from 3,208,000 to 4,304,000 and the number of lambs tailed from 1,182,000 to 2,344,000.

The intensification of sheep farming has also brought about a change in breeding practices, which is illustrated in table 3.

TABLE 3—VARIOUS BREEDS AS PERCENTAGE OF TOTAL RAMS

Breed	1920 Per cent.	1947 Per cent.
Lincoln, English and Border Leicesters	18	1
Romneys	75	68
Southdown	6	29
Other	1	2

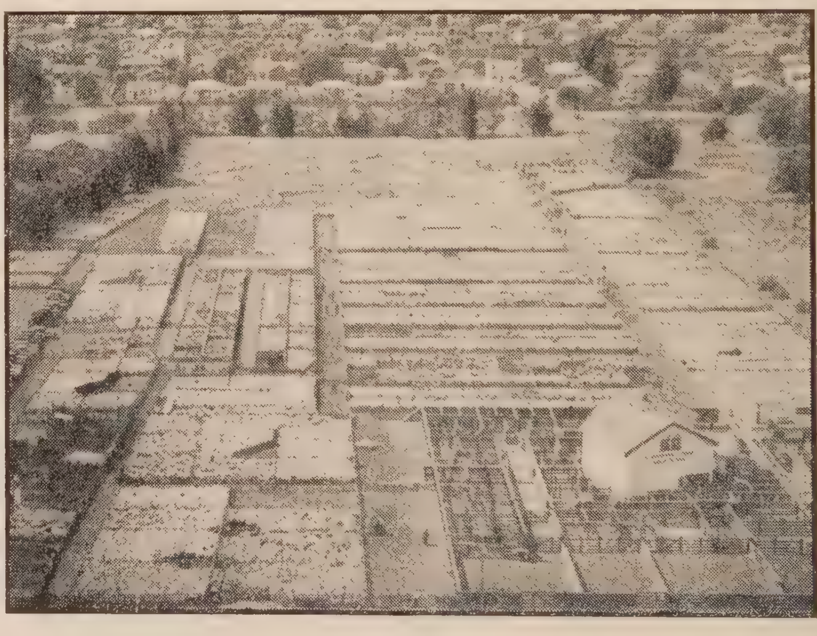
In Northern Hawkes Bay there are isolated areas, such as the river flats in the vicinity of Wairoa, the river terraces toward the mouth of the Mohaka River, and the area around Tutira, where there are some sheep-fattening farms. In mid and southern Hawkes Bay the fat lamb producing areas extend westward from Hastings and then southward in a wide stretch to the southern end of the district at Woodville; the area includes the greater part of the coastal hill country except for the higher and more broken part in the south-east. Most of the Heretaunga Plains, the Te Aute Valley, the Takapau - Ruataniwha Plains, and a portion of the flats at Dannevirke and Woodville come into this category.

It is on the Ruataniwha-Takapau Plains that the increase in sheep numbers has been most pronounced; here the carrying capacity has increased from 1 to 4 sheep per acre, due largely to the introduction of subterranean clover and top dressing.

The breeding practices within the section are fairly uniform and the Southdown is the predominant ram for fat lamb production. Lambs are sold fat off the mothers from November onward, and ewes are fat for the freezing works by December or January. Thus most of the breeding stock are sold from farms by January. This has the disadvantage that as it is necessary for many farmers to buy in fresh ewes at the same time, there is a shortage; competition is keen and prices are high. To overcome this an increasing number of farmers are running a certain number of ewes with Romney rams so that they may breed some of their flock replacements. The remainder of the flock replacements come from the surrounding store sheep country.

On the Heretaunga Plains some farmers, when there is ample feed available, buy in dry sheep for fattening from January to April. Because the area is handy to the Stortford Lodge saleyards, this practice is usually satisfactory, as farmers are in close touch with market conditions and can take advantage of any favourable turn in the market.

The intensification of sheep farming for fat-lamb production has resulted in an over-all increase in the acreage devoted to the provision of fodder



[N.Z. Aerial Mapping Ltd. photo.

Stortford Lodge saleyards, the main stock-disposal centre of Hawkes Bay

[*National Publicity Studios photo.*

It is on the Ruataniwha-Takapau Plains that the increase in sheep numbers has been most pronounced; here the carrying has increased from 1 to 4 sheep per acre, due largely to the introduction of subterranean clover and topdressing.

crops. In 1920 green fodder, root crops, and cereal crops fed off amounted to 27,200 acres and in 1947 to 46,200 acres. Today chou moellier accounts for nearly 44 per cent. of the acreage in supplementary fodder crops.

Not much supplementary feed is grown in northern Hawkes Bay and what is provided is chou moellier. On the Heretaunga Plains many fat-lamb farmers have stands of lucerne, which provide hay for the winter. In addition chou moellier is often grown and some farmers grow pumpkins for a late-autumn and winter fodder crop, but pumpkins are not used to the same extent as on dairy and mixed farms. In the dry summer months chou moellier and kale are grown for supplementary feed to fatten the lambs not sold off the mothers, the ewes, and any bought-in stock.

On the Takapau-Ruataniwha Plains, where drier conditions prevail and the winters are relatively severe, considerable areas of chou moellier and some turnips are provided, but increased areas of lucerne could be grown for hay. However, good use is made of lucerne for early autumn grazing. Rape is the usual supplementary crop in summer, and lucerne, meadow hay, and chou moellier are fed in winter. Fat-lamb farmers on the Takapau-Ruataniwha Plains usually run some cattle, but they are used mainly to control feed and few farmers breed cattle.

Throughout Hawkes Bay the usual grazing management practice is that of set stocking or infrequent changing of sheep from one paddock to another according to feed conditions, and even on the fattening farms quick rotational grazing is rare.

On practically all farms the shearing of dry sheep begins in late September, the main shearing following in December. Some farmers breeding from Romney rams shear wether lambs only, while others shear both wether and ewe lambs. Most farmers do crutching before the ewes are mated and again before the ewes begin lambing.

Some idea of the importance of the Hawkes Bay fattening farms can be obtained from the slaughtering figures at the three freezing works in the district. For the 1947-48 season 484,200 sheep, 1,536,200 lambs, 52,800 cattle, and 14,900 pigs were handled.

Dairy Farming

Although the number of holdings on which dairy cows are milked in Hawkes Bay is 3840 out of a total of 5180 holdings, the number of herds with 9 or fewer cows is 2700 or 70% of the total herds. The importance of dairying compared with many other districts is not great. However, over the past 27 years the number of dairy cows in milk has increased; in 1920 there were 31,000, in 1934 a peak of 71,200 was reached, and in 1947 there were 49,100.

In the north of the district on the flats adjacent to Wairoa this type of farming is the feature, and there are two dairy factories in the area, a butter factory at Wairoa and a cheese

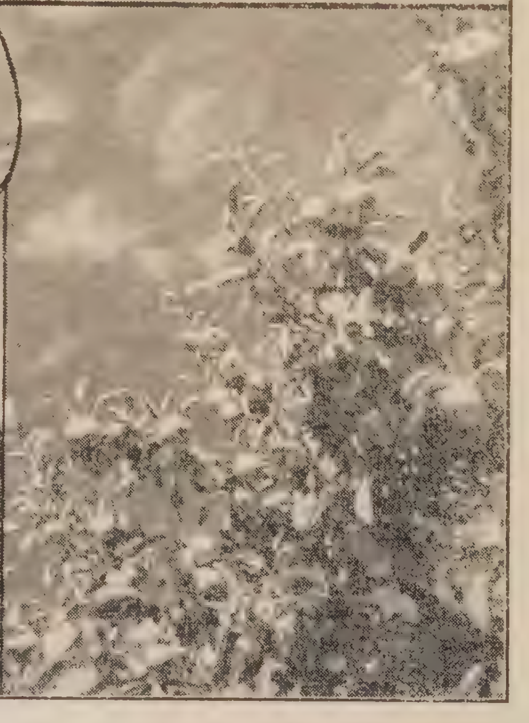
Below—Tomoana Freezing Works, Hastings. For the 1947-48 season 484,200 sheep 1,536,200 lambs, 52,800 cattle, and 14,900 pigs were handled at the three freezing works in Hawkes Bay. N.Z. Aerial Mapping Ltd. photo.

MARKET GARDENS AND ORCHARDS IN HAWKES BAY

The main commercial orchards and market gardens in Hawkes Bay are on the fertile Heretaunga Plains.

Above—Orchards and gardens at Hastings. At right—Harvesting peas for canning. Below—Cultivating in a peach orchard; Hawkes Bay is New Zealand's largest producing area for peaches, pears, and nectarines.

Lower left—Vineyards at Te Awanga. Lower right—Apples are the principal crop grown in Hawkes Bay orchards and in recent years about 1,000,000 bushels have been produced in seasons when conditions have been favourable.



Photographs at top left by Whites Aviation Ltd.; at top right and bottom right by National Publicity Studios; and at bottom left by News-photo Service Ltd.

Typical rolling country in Hawkes Bay.

factory at Nuhaka. The pastures on this dairying area in the main comprise perennial ryegrass, white clover, paspalum, and cocksfoot. Because of the warm climate, paspalum does quite well in the district. On the easier country around Mohaka, between Wairoa and Napier, there are Maori settlements where dairy farming again predominates, the development of this area as a dairying district being due partly to the efforts of the Maori Affairs Department.

Though the Heretaunga Plains is not a dairying area a number of holdings there run some dairy cows, but approximately 70% of the herds contain fewer than 20 cows. Some of the herds cater for town milk supply for Hastings and Napier, the daily production for which is approximately 4000 gallons, and others supply the butter factory at Hastings. Due to the lucrative returns which can be obtained from other farming pursuits and the dry conditions frequently obtaining in the late spring and summer, dairying is not as important in this section of Hawkes Bay as might be expected.

The most important dairying area is situated in the southern part of the district on the easier and flat country around Norsewood, Dannevirke, and Woodville, where the rainfall is higher; for instance Dannevirke has an average annual rainfall of 44.02in. and Woodville 51.12in. In the southern sector approximately 1000 holdings run dairy cows and of these 40% have herds of over 30 cows. Ten butter and cheese factories cater for the district. Except for the Heretaunga Plains the average size of holding is smaller here than in other parts of the district.

Pastures are mainly perennial ryegrass, cocksfoot, and white clover, and for winter supplementary feed considerable areas are saved for hay, approximately 36 per cent of the areas saved for hay in Hawkes Bay being in this dairying area.

Mixed Farming

On a number of farms on the Heretaunga Plains and some on the Ruataniwha Plains quantities of grass seed are harvested, the chief crop being perennial ryegrass, which produces a higher average yield per acre there than in any other part of the Dominion. In 1946-47 the total area of perennial ryegrass saved for seed was 11,000 acres, 15 per cent. of the acreage saved in New Zealand. Some areas of cocksfoot and red and white clover are grown for seed, but they do not occupy 1000 acres and are not nearly as important as the perennial ryegrass.

On the mixed farms ryegrass seed production and fat-lamb raising are complementary for the efficient utilisation of pastures. The general practice is to concentrate ewes and lambs on certain paddocks during the spring flush of growth and to shut up the balance of the farm early in November for a ryegrass seed crop.

It is perhaps more true to say that the majority of the Heretaunga Plains farms are mixed farms which really represent the third stage in the development of the area. First there was the agricultural stage when grain growing was important; then followed a period which was mainly pastoral and the present stage is characterised by intensive farming on fairly small holdings, revenue coming from the sale of fat lambs, wool, and grass seed.

Small Holdings

Small holdings fall into two categories, market gardens and commercial orchards.

Market Gardening

The relatively large market garden industry of Hawkes Bay is a recent development. In 1920 there were approximately 150 acres devoted to market gardening on the Heretaunga Plains but it was not until the impetus given by the war that it developed into a major industry in the district. New Zealand was required to provide quantities of canned and processed vegetables for large armed forces in the Pacific and this developed the canning industry in Hastings, which in turn needed large local supplies of fresh vegetables. In the 1943-44 season approximately 1300 acres were devoted to market garden crops, but by the next season the area reached 3000 acres. It was anticipated that the cessation of hostilities would result in a large decrease in the area devoted to market gardening, but this has not been the case, as considerable quantities of vegetables are still canned and processed for local and overseas consumption; for instance in 1948 approximately 600 acres of peas were grown for canning and quick freeze.

Around Taradale, Pakowhai, and Clive and at Bay View, to the north of Napier, areas of tomatoes, potatoes, peas, asparagus, and beans are grown, the early crops coming from Bay View, which has a milder climate. At Bay View peas are picked in spring and lettuce is ready for cutting toward the end of August; tomatoes are planted outside any time after the middle of September and harvesting begins about the middle of December.

On some market garden areas small fruits such as gooseberries, currants, loganberries, and strawberries are also grown.

TABLE 4—*AREA IN MARKET GARDEN CROPS ON HERETAUNGA PLAINS

Year	Acres
1919-20	148
1924-25	220
1929-30	430
1934-35	409
1939-40	891
1944-45	1,938
1946-47	1,794

* Areas within borough boundaries excluded.

Commercial Orchards

The soils and climate of the Heretaunga Plains have proved admirable for fruit growing and today it is a very important industry around Hastings, where there are approximately 3000 acres in orchards. It is estimated that there are approximately 1300 acres of apples, 270 acres of pears, 740 acres of peaches, and 270 acres of plums, besides areas of quinces, apricots, nectarines, and small fruits, of which 115 acres are in raspberries. The orchards are mixed plantations containing mainly apples, with smaller plantings of pears and stone fruits.

Hawkes Bay ranks as the largest producing area in the Dominion for pears, peaches, and nectarines and second largest for apples, and the production of fruit per tree is higher than in any other part of New Zealand.

In 1947-48 the production from the orchards was about 993,000 bushels of apples, 249,000 bushels of pears, 9000 bushels of quinces, and 315,000 bushels of stone fruits, of which peaches accounted for 250,000 bushels and plums 43,000 bushels. For last season 380,000 cases of fruit were exported from the port of Napier.

The first commercial orchards were established in the district in the 1890's, but is was not until the development of an export trade in fresh fruit from 1922 onward that the industry showed real development, and it is one of the few areas in the Dominion where orchard areas are still expanding. New plantings in 1948 comprised approximately 3500 apple trees, 6500 peach trees, 3000 plum trees, and 1500 apricot trees.

Ewes and lambs grazing on lucerne on a Hastings farm.

TABLE 5—*AREA IN COMMERCIAL ORCHARDS ON HERETAUNGA PLAINS

Year	Acres
1919-20	1,970
1924-25	2,230
1929-30	2,554
1934-35	2,941
1939-40	2,914
1944-45	2,736
1946-47	2,913

* Areas within borough boundaries not included.

The orchards have a well-cared-for appearance and orchardists have been steadily mechanising their work by the purchase of new power sprayers, tractors, cultivating implements, and grading equipment. This has contributed to increased efficiency, easier working conditions, and better crops.

The potentialities of the district for fruit growing are illustrated by the rapid growth of the preserved fruit industry in the district. The canning factory at Hastings was established in 1935 and had an initial output of 25,000 cans per annum. By the beginning of the war the annual output had increased to 1,000,000 cans per annum, but this was greatly increased to meet the requirements of the armed forces. In 1946 the output was 11,000,000 cans, and with a seasonal staff of 500 employees the factory is now the largest canning factory in the Dominion. Canned products include peaches, pears, plums, asparagus, tomatoes, peas, and beans.

Vineyards are established at Greenmeadows, Taradale, Havelock North, Bay View, and Eskdale. Most of the vineyards are on flat or gently undulating land, but in some places hillsides have been selected, to minimise damage by frost. The area in grapevines is increasing; in 1934-35 it was 58 acres and by 1946-47 it had increased to 173 acres. The production of wine is carried out at Greenmeadows, Taradale, Havelock North, and Hastings.

Pasture Production and Management

The main types of pastures in Hawkes Bay can be divided broadly into the following types:—

Ryegrass and white clover pastures: These very productive pastures are found mainly on the recent soils of the fertile alluvial flats of the Heretaunga Plains and other smaller areas such as the Esk River flats. They are used mainly for fattening sheep and some areas are set aside for the production of grass and clover seed. In the north, around Wairoa and along the coast toward Nuhaka and on parts of the easy hill country, an additional constituent of the ryegrass-white clover pasture is paspalum, which does well in the warm climate of this district. Here the pastures are used mainly for grazing dairy cows and for fat lamb production, but small areas are set aside for white clover and ryegrass seed.

On the former bush areas in the higher-rainfall districts around Dannevirke and Woodville the pastures fall into this division. Here they are largely utilised by dairy herds. In this area considerable areas are shut up for hay.

On the fertile recent soils of alluvial flats the pasture seed mixture is usually 40lb. of Certified perennial ryegrass and 2lb. Certified white clover.

Subterranean clover-ryegrass pastures on plains: In the low rainfall belt on parts of the Ruataniwha Plains around Tikokino and Ongaonga there are now considerable areas where subterranean clover is the dominant pasture constituent. Much of this land was sown down within the last 20 years with a permanent pastures which included perennial ryegrass and subterranean clover. As a result of successive dry summers much of the ryegrass was unable to survive and the pastures tended to become predominantly subterranean clover. However, it has been found possible to renew effectively these pastures by harrowing and oversowing in the autumn with 20lb. of perennial ryegrass seed per acre. In future when laying down these areas after crops the inclusion of *Phalaris tuberosa* in the mixture should provide ground cover in the dry period and, to a certain extent, protect the roots of the ryegrass from the heat of the sun, as well as providing a considerable quantity of winter feed.

Danthonia: The pastures which are dominantly danthonia occupy the greater part of Hawkes Bay. In addition they usually contain some browntop. These pastures occur in the north, on the lower hill country and on the coastal hills to the south of Napier, and on some of the hill country to the east of the main ranges. On valley floors, within the section, there are areas of ryegrass-white clover pastures.

Most of this country is devoted to sheep farming for the production of wool and store sheep, though where farmers have good flats of better pastures some lambs are fattened.

Danthonia (improved pastures): On some of the more accessible hills and flatter areas of the danthonia country pasture improvement has been taking place and some pastures have been sown down in perennial ryegrass, crested dogstail, cocksfoot, and some subterranean clover, with white clover taking the place of, or associated with, subterranean clover on the higher rainfall areas. The result is that the perimeter of the fat lamb producing areas is gradually pushing out on to this country.

To improve the pastures on this hill country the following methods are usually adopted:—

On land which it is impossible to traverse with harrows or any type of implement 3 to 4lb. of subterranean clover is usually surface sown together with 1½ cwt. of serpentine superphosphate or superphosphate; 1 to 2lb. of Certified white clover is added if the fertility and rainfall are sufficiently good.

On less steep land where it is only just possible to break the turf with harrows or discs the mixture sown normally comprises 10lb. of Certified perennial ryegrass, 2lb. of crested dogstail, 3lb. of subterranean clover, and 2lb. of Certified white clover. Where the land is too steep to plough satisfactorily and there is a danger of erosion giant discs are used to provide a seed bed, and with 1½cwt. of superphosphate the pasture mixture comprises 15lb. of Certified perennial ryegrass, 6lb. of Certified cocksfoot, 3lb. of crested dogstail, 2lb. of Certified white clover, and 3lb. of subterranean clover.

On the ploughable country giant discs which are capable of providing a satisfactory seed-bed, are being used extensively. The usual practice is to sow a crop of chou moellier or turnips in October or November, feed this off in the winter, and in the following spring sow rape or allow the area to be fallow until the autumn, when it is sown to pasture with 28lb. of Certified perennial ryegrass, 8lb. of Certified cocksfoot, 2lb. of Certified white clover, 2lb. of crested dogstail, and 3lb. of subterranean clover. On lighter soils the mixture may be varied to 22lb. of Certified perennial ryegrass, 10lb. of Certified cocksfoot, 2lb. of crested dogstail, 2lb. of Certified white clover, and 4lb. of subterranean clover. Superphosphate at the rate of 1½cwt. per acre is also applied. The seed mixtures are varied according to soil type, locality, and climate. For instance, north of Napier the quantity of cocksfoot sown is either omitted or reduced and paspalum substituted.

Browntop pastures: To the west, along the main ranges, where the rainfall is over 60in., there is a stretch of country where browntop is dominant. The country is generally steep and broken and there is scrub and second growth invasion. The occupied portion of the section is used for extensive sheep farming, returns coming from wool and store and breeding stock.

Lime and Fertilisers

There are five lime works in the district, but the quantity of lime used is relatively small. During the war, when superphosphate was in short supply, the amount of lime used increased considerably, but it has since fallen to pre-war levels. Though Table 6 does not show the actual amount used in view of the quantity taken from works to farms by road transport, it does give an indication of the trend in the use of lime.

Development work on Ahuriri Lagoon, which was raised by the earthquake of 1931.

TABLE 6—AGRICULTURAL LIME DELIVERED AT OFFICERED RAILWAY STATIONS IN HAWKES BAY

*Year	Tons
1935	5,837
1940	9,077
1945	12,604
1949	5,544

* Year ended March 31.

Except for the war period, there has been a steady increase in the use of artificial fertilisers and their use is likely to increase much further. A peak was reached in 1941, but with war time rationing there was subsequently a large decrease. However, for the year ending March 31, 1949, the amount used in Hawkes Bay reached a record figure.

TABLE 7—ARTIFICIAL MANURES DELIVERED AT OFFICERED RAILWAY STATIONS IN HAWKES BAY

*Year	Tons
1935	19,732
1940	37,436
1945	23,734
1949	55,438

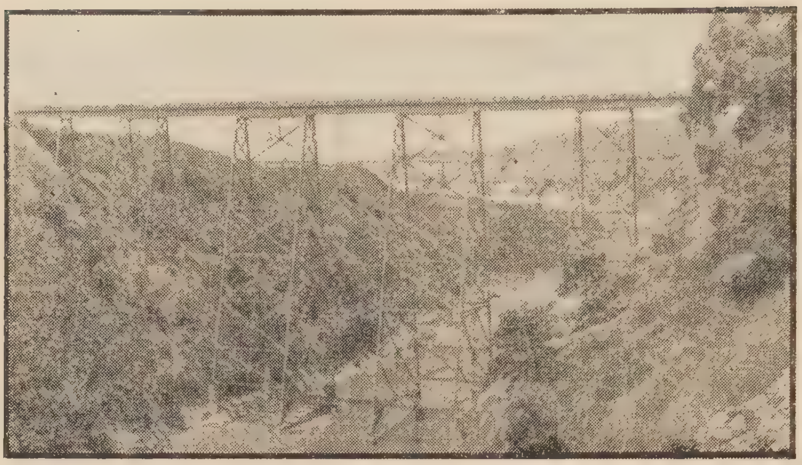
* Year ended March 31.

Ahuriri Lagoon Reclamation

No description of farming in Hawkes Bay is complete without reference to the reclamation of the Ahuriri Lagoon. As a result of the earthquake of February 31, 1931, the bed of what was once a salt lagoon of 7500 acres was raised from 5ft. to 8ft. above its former level, much of the sea bed

Eroded country near Mohaka in northern Hawkes Bay. Whites Aviation Ltd. photo.

FARMING IN HAWKES BAY



[National Publicity Studios photo.

Parts of Northern Hawkes Bay are deeply dissected by gorges, which made the construction of the railway between Napier and Wairoa a difficult undertaking. It involved the building of the Mohaka Viaduct, shown above, the highest (318ft.) in New Zealand.

being exposed and the balance covered with shallow salt water.

In 1932 samples of soils were taken by the Chief Chemist of the Department of Agriculture and in 1934 the Public Works Department began a comprehensive drainage scheme, it being realised that in view of its proximity to Napier the area eventually would be valuable farming land. Approximately 11 miles of stopbank were erected as a protection from flood waters from the hills and to exclude the sea. Two pumping stations capable of handling 30,800 gallons of water per minute were installed to remove the water from the enclosed area. As de-watering proceeded 26 miles of internal roads were constructed, 34 miles of main drains were excavated, and 354 miles of parallel lateral drains 2 chains apart were dug to hasten the removal of surface salt. By 1939, 90 miles of 7 and 8 wire fences had been erected and an artesian water supply installed to reticulate the whole area. In the 5 years up to 1939, 1250 acres had been ploughed and cultivated under the direction of the Lands and Survey Department. The first sowing of pasture and crops took place in 1937. Farm buildings including a manager's and shepherd's cottage, wool shed, implement shed, and dutch barns have been erected and shelter belts and plantations have been provided.

The area is being run as a station and by 1947, although only 2400 acres had been cultivated, access over the whole area was available for grazing stock. At June 20 of that year the stock carried comprised 3175 breeding ewes, 9770 wethers, 716 hoggets, and 59 rams. During that year 51 acres of Certified perennial ryegrass for seed and 65 acres of barley were harvested and in addition an area of 2½ acres of asparagus yielded 3189lb. for sale. Lucerne grows particularly well, there being an area of 84 acres from which as many as five cuts may be taken in a season. Other fodder crops included 37 acres of Japanese millet, 30 acres of field pumpkins, and 25 acres of mangolds.

The eventual subdivision of the area depends on the rate at which the salt is removed, and up to the present only ten 10-acre sections have been allocated to returned servicemen. Cottages have been erected on the sections and the men are concentrating mainly on market garden crops.

Soil Conservation and River Control

In many parts of Hawkes Bay soil erosion has developed to a serious stage. In the past burning was a principal weapon in attempting to establish pastures in place of fern and manuka, and this combined with overgrazing, rainfalls of high intensity, earthquakes, and rabbits has contributed to two problems: Land deterioration and increased flooding and sedimentation of river courses.

Some of the worst flooding in New Zealand has occurred in Hawkes Bay and that in the Esk Valley in April, 1938, was the most severe. The catchment area of the Esk River is about 115 square miles, and as a result of the flooding the valley flats of 1750 acres were left with a siltation of an average depth of 3ft. 6in.

The work of soil conservation and rivers control is being undertaken by the Hawkes Bay Catchment Board and River Boards and already considerable flood control and channel improvement work on some of the rivers has been undertaken.

Transport and Markets

Napier was connected with Wellington by rail in the early nineties, but it was only within the last 12 years that it has been connected with Wairoa, in the north of the district. The railway enters the district in the south-west at Woodville, continues north-north-east to Napier, then in a northerly direction to Wairoa, about 73 miles by rail from Napier, and then on to Gisborne. The main road through the area from Wellington to Gisborne follows close to the railway. The Napier-Taihape road is the only outlet across the western mountains, and the Napier-Taupo road provides communication with the north-west to Rotorua and Auckland. Generally the district is well provided with all-weather roads, except in a few sparsely settled areas of steep country to the west, north-west, and south-east.

The port of Napier is the port for the district, and a considerable amount of the export produce from the area passes through this port. For the year ended December 31, 1948, 46 overseas vessels entered the port and lifted 126,000 tons of cargo, the greater portion being made up of frozen meat and wool. Shipping services from Napier are also available to other New Zealand ports.

The main stock market for the district is Stortford Lodge, at Hastings and this is one of the most important sheep markets in the Dominion. For the year ended June 30, 1948, 333,200 sheep and lambs and 29,700 head of cattle were disposed of through these saleyards. Wool sales are held at Napier, and most of the wool from Hawkes Bay and the Gisborne district is now sold at the Napier sales.

Except for some sparsely settled areas, the district is well reticulated for electricity.

Possible Change

The greater part of Hawkes Bay is well endowed with most of the essentials for successful farming: A good climate, adequate rainfall, and sufficient limestone deposits for its requirements. Droughts occur at intervals, but the recovery in stock and pastures is rapid. There may be changes in the future, such as a change over to dairying in certain areas when fertilisers are more readily available and subdivision occurs, but at present there is unlikely to be any swing in this direction.

The district is capable of producing almost any type of farm product found in countries of temperate climates, and there are probably few areas in New Zealand where the farmer is so well compensated for his efforts.

Warning of Danger of Caustic Soda

ABOUT 30 years of experience of the use of caustic soda for cleaning milking machines has demonstrated that it is the best alkali for the purpose, but unfortunately it is a dangerous chemical. A fatality was recently reported from Northland where a 2-year-old child, while playing in a cowshed, spilt a tin of caustic soda over himself. He was taken to hospital, but died later. It is appropriate therefore to repeat the warning about caustic soda which has been given from time to time in Departmental publications.

Keep the tin containing caustic soda in a safe place with the LID ON TIGHT in case a child should get access to it to play with the contents or drink the alkali after it is liquefied by absorbing water.

Before discarding an empty tin swill it with boiling water.

—*G. M. MOIR, Dairy Chemist, Department of Agriculture, Wallaceville.*

Packing Honey and Disposing of Surplus Beeswax

Seasonal Notes for the Domestic Beekeeper

THE packing of honey and the disposal of surplus beeswax are a problem to most domestic beekeepers. Helpful information about this work is given by R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga, in this month's article for the domestic beekeeper.

WHETHER domestic beekeepers extract or press the new season's crop from the comb, adequate straining of the honey is usually a problem. Elaborate straining methods used by some commercial beekeepers are costly, but a double layer of cheese-cloth tied with strong string over the top of the honey tank will provide a cheap and effective strainer. Warm honey will flow readily through this type of strainer, but if thick or cold honey is to be strained, it is considered advisable to use a coarse-gauze strainer to catch all the heavy particles of wax and foreign material which may prevent the honey passing through the cheese-cloth. However, despite these precautions, the cheese-cloth occasionally becomes clogged and many beekeepers scrape the material with the edge of a spoon and force the honey through the strainer, thus causing small particles of wax to appear in the body of the honey and defeating the object of straining. This problem is easily overcome if a spare cloth is always available, as it is a simple matter to change cloths and to wash the clogged cheese-cloth in warm water.

When handling his crop the beekeeper should realise that honey is a food and therefore cleanliness is essential. All utensils and equipment should be sterilised before use and the honey kept covered from dust, flies, etc.

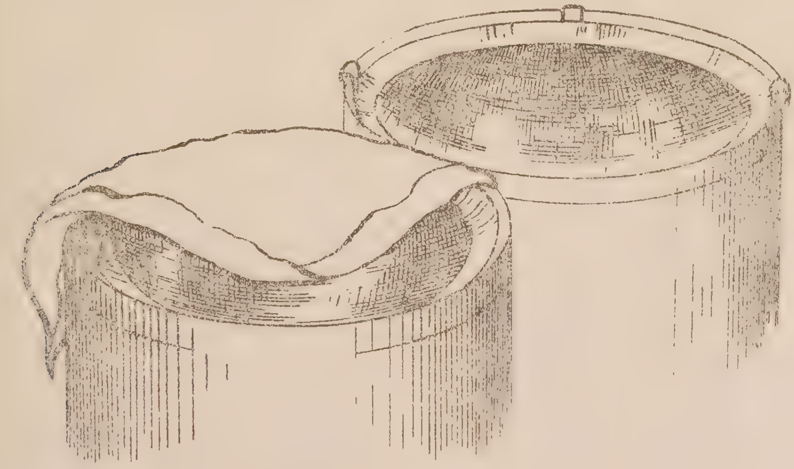
Granulation

Most domestic beekeepers through lack of sufficient knowledge on the subject seldom process their honey correctly. Consequently, their final product has a coarse grain and is not very palatable.

All honeys will granulate in time, but the quicker the process the smoother the grain. Quick granulation is achieved by the addition of a "starter" and the storing of the packed honey immediately in a consistent temperature of about 56 degrees F. for a few days.

After the honey has been extracted from the bee combs, strained well, and allowed to stand in the holding tank for two or three days all accumulated scum should be skimmed off. This can be done in a variety of ways, but the domestic beekeeper may find a tablespoon best suited for the operation. The scum should not be left around the honey house or fed to the bees, but buried deep enough to prevent it from being gathered by foraging bees.

About 5 to 10 per cent. of starter honey, which consists of smooth-grained honey usually held over from the previous season, can then be added to the new crop. These fine crystals are introduced solely to start granulation and it is therefore essential to stir this starter honey thoroughly into the new crop. When the beekeeper is satisfied that he has a perfect mix the honey may be run off into containers and, if possible, stored in a consistent temperature of about 56 degrees F.



Cone-shaped wire-gauze and cheese-cloth honey strainer.

Beeswax

Throughout the season beeswax in the form of burr comb, cappings, and old combs is constantly being wasted by the beekeeper who fails to realise that, if saved and rendered down, this valuable by-product of the apiary will bring in a substantial return.

When drained free of surplus honey wax cappings should not be thrown away, but stored if necessary until there is sufficient to render down; care should be taken that it is stored where bees and mice cannot gain access to it. Similarly, bits and pieces of new comb (burr comb) built irregularly by the bees and cleaned off the frames by the beekeeper during the honey season should be saved, but the small-scale beekeeper should make no attempt to salvage wax from old, dark-coloured brood combs, as these yield very little wax and a press is necessary for satisfactory results. This press is described in Bulletin No. 267 "Beekeeping in New Zealand," published by the Department of Agriculture.

Removing wax cappings from a comb of honey before extraction.

There are many different methods in vogue for the melting of cappings and combs, but fortunately it is possible for the domestic beekeeper to render wax into a form acceptable to manufacturers without purchasing additional equipment.

The following is a satisfactory method:—

Place all surplus beeswax into a copper with enough water added to cover the wax. Care must be taken to ensure that the copper is not too full or the fire too fierce, as either factor may cause the wax to boil over, with unpleasant results. When fully melted the wax, which will be floating on top of the water, is ready for straining. For the domestic beekeeper an old flour bag makes an ideal strainer and a kerosene tin or a 60lb. honey tin is a suitable container for holding the melted and clarified wax. When dipping the wax from the copper it is impossible to avoid collecting a certain amount of water. However, this is of no consequence; in fact it may help the wax to pass more freely through the strainer.

When all the wax has been skimmed, dipped out of the copper, and poured into the strainer it is necessary to twist the top of the bag to force and squeeze the remaining wax out of the accumulated slumgum. To prevent the block of wax cracking and so spoiling its appearance wrap the tin in old sacking and allow it to cool slowly.

LAMBING ESTIMATES FOR 1949

Dominion Percentage Highest on Record

By the Livestock Division.

THE estimated lambing percentage of the Dominion for the 1949 season of 96.48 is the highest on record. This is an appreciable increase of 3.37 per cent. on the previous highest figure of 93.11 per cent., which was recorded for 1947. The percentage last year was 92.72.

New records also are established for both the North Island and the South Island. The North Island percentage has risen from 89.43 in 1948 to 94.55 in 1949, an increase of 5.12. The previous best percentage was 92.56 in 1945 which has been exceeded by 1.99 per cent. The South Island figure for 1949 of 98.93 per cent. is 2 per cent. higher than the previous best, 96.93 in 1948.

AUCKLAND DISTRICT

County	Breeding ewes (as at 1949)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	30,626	89.23	27,328
Whangaroa	13,724	84.70	11,624
Bay of Islands	62,437	92.60	57,863
Hokianga	44,490	82.07	36,513
Whangarei	88,149	90.08	79,405
Otamatea	79,509	90.62	72.051
Hobson	78,516	89.41	70.201
Rodney	96,600	82.76	79,946
Great Barrier	6,224	67.20	4,183
Waitemata	75,295	96.96	73,006
Eden	4,231	85.27	3,608
Manukau	67,486	92.38	62,344
Franklin	134,872	97.74	131,824
Coromandel	31,533	80.30	25,321
Thames	9,821	90.20	8,859
Hauraki Plains	17,960	91.35	16,406
Ohinemuri	19,336	96.82	18,721
Waikato	165,391	98.59	163,059
Raglan	435,414	94.30	410,595
Waipa	181,038	101.19	183,192
Piako	134.534.	97.97	131,803
Matamata	283,278	97.96	277,499
Rotorua	102,714	100.03	102,745
Taupo	27,664	91.06	25,191
Taumarunui	107,605	93.00	100,073
Kawhia	69,990	90.93	63,642
Otorohanga	146,766	140.00	205,472
Waitomo	360,934	93.55	337,654
Ohura	118,719	93.50	111,002
Kaitieke	65,766	94.00	61,820
Tauranga	148,366	99.28	147,298
Whakatane	55,177	96.80	53,411
Opotiki	47,131	80.00	37,705
Totals	3,311,346	96.38	3,191,364

EAST COAST-HAWKES BAY DISTRICT

County	Breeding ewes (as at 1949)	Estimated percentage of lambs	Estimated number of lambs
Matakaoa	62,617	84.00	52,598
Waiapu	238,834	82.30	196,560
Uawa	119,304	81.20	96,875
Cook	413,148	89.20	368,528
Waikohu	359,940	90.40	325,386
Wairoa	400,438	86.62	346,859
Hawkes Bay	940,206	91.45	859,818
Waipawa	438,345	98.54	431,945
Waipukurau	137,726	97.13	133,773
Patangata	502,181	92.00	462,007
Weber	52,892	95.04	50,269
Dannevirke	289,197	97.31	281,418
Woodville	84,062	103.57	87,063
Pahiatua	162,523	95.66	155,470
Akitio	160,747	89.24	143,451
Totals	4,362,160	91.51	3,992,020

WEST COAST-WELLINGTON DISTRICT

Clifton	87,215	93.62	81,651
Taranaki	27,170	100.18	27,219
Inglewood	51,130	94.85	48,497
Egmont	20,361	99.80	20,320
Stratford	107,842	93.07	100,369
Whangamomona	56,567	91.66	51,849
Eltham	52,776	98.46	51,963
Hawera	78.491	99.92	78,428
Waimate West	5,787	98.80	5,718
Patea	206,751	102.58	212,085
Waitotara	135,887	98.99	134,515
Waimarino	166,714	92.00	153,377
Wanganui	276,790	85.10	235,548
Rangitikei	966,066	100.00	966,066
Oroua	213,019	99.55	212,060
Kairanga	111,451	102.60	114,349
Kiwitea	245,167	100.05	245,290
Pohangina	130,446	96.00	125,228
Manawatu	143,493	101.60	145,789
Horowhenua	118,159	100.93	119,317
Hutt	63,859	79.92	51,036
Makara	46,705	89.04	41,586
Featherston	316,672	91.40	289,438
Wairarapa South	171,822	97.39	167,337
Masterton	288,513	91.10	262,835
Castlepoint	94,343	92.90	87,645
Eketahuna	129.797	92.00	119,413
Mauriceville	46,581	96.10	44,764
Totals	4,359,574	96.19	4,193,692

LAMBING ESTIMATES FOR 1949

MARLBOROUGH-NELSON-WESTLAND DISTRICT

County	Breeding ewes (as at 1949)	Estimated percentage of lambs	Estimated number of lambs
Waimea	163,408	83.0	135,629
Takaka	27,793	84.0	23,346
Collingwood ..	13,651	81.0	11,057
Buller	1,662	92.8	1,542
Inangahua	13,814	95.5	13,192
Murchison	27,567	87.0	23,983
Grey	24,140	113.2	27,326
Westland	33,250	118.7	39,468
Sounds	96,687	77.9	75,319
Marlborough ..	207,909	81.3	169,030
Awatere	170,810	90.2	154,071
Totals	780,691	86.33	673,963

CANTERBURY-KAIKOURA DISTRICT

Kaikoura	129,275	87.5	113,116
Amuri	218,408	98.3	214,695
Cheviot	146,995	98.3	144,496
Waipara	286,344	100.3	287,203
Ashley	60,550	92.0	55,706
Kowai	74,390	101.0	75,134
Oxford	65,822	92.7	61,017
Rangiora	40,891	106.8	43,672
Eyre	51,441	113.3	58,283
Tawera . ..	50,303	85.1	42,808
Malvern	132,230	102.3	135,271
Paparua	35,863	130.9	46,945
Waimairi	4,015	100.0	4,015
Heathcote	6,977	91.4	6,377
Akaroa	85,970	110.0	94,567
Mount Herbert ..	38,865	102.0	39,642
Wairewa	70,170	105.0	73,679
Halswell	14,945	106.0	15,842
Springs	30,948	107.0	33,114
Ellesmere	74,544	113.0	84,235
Selwyn	134,610	85.7	115,361
Ashburton	758,264	108.3	821,200
Geraldine	253,469	98.0	248,400
Levels	179,085	114.6	205,231
Mackenzie	293,311	89.2	261,633
Waimate	472,302	89.9	424,599
Chatham Islands ..	44,205	73.0	32,270
Totals	3,754,192	99.58	3,738,511

New Zealand Young Farmers to Compete in Australian Radio Contest

YOUNG farmers' clubs are now choosing members for the district elimination contests to be held early in February for the selection of competitors for the four council finals and New Zealand final of a Y.F.C. leadership contest to be broadcast from national stations of the New Zealand Broadcasting Service. The winner will represent the New Zealand Federation of Young Farmers' Clubs in the final of the Australian Junior Farmer Leadership Contest to be broadcast by the Australian Broadcasting Commission at the Sydney Easter Show.

In the contest, which is sponsored by the Australian Broadcasting Commission, competitors are required to discuss before the microphone and without script the work in their districts and clubs. They must answer questions to test their knowledge of the work on the home farm, and give briefly ideas on how they or their clubs could contribute or have contributed to a better community life. Competitors must be between 16 and 21 years of age on April 1, 1950.

The four council finals, which will be broadcast from the respective national stations, will be held before March 10, and the Dominion final, over a national link, in the following week.

OTAGO-SOUTHLAND DISTRICT

District	Breeding ewes (as at 1949)	Estimated percentage of lambs	Estimated number of lambs
Waitaki	440,778	94.0	414,331
Maniototo	235,232	90.5	212,885
Vincent	235,232	91.0	214,061
Waihemo	98,903	94.0	92,969
Waikouaiti ..	71,082	92.0	65,395
Taieri	166,984	87.0	145,276
Peninsula	17,143	103.0	17,657
Clutha	455,599	101.0	460,155
Tuapeka	345,445	95.0	328,173
Bruce	232,981	98.0	228,321
Lake	121,630	86.0	104,602
Southland	1,897,408	109.0	2,068,175
Wallace	616,662	98.0	604,329
Stewart Island ..	2,327	80.0	1,862
Totals	4.937.406	100.42	4,958.191

DISTRICT ESTIMATES

The following table gives the estimates of the current (1949) season's lambing for each sheep district:—

Auckland	3,311,346	96.38	3,191,364
East Coast-Hawkes Bay	4,362,160	91.51	3,992,020
West Coast-Wellington	4,359,574	96.19	4,193,692
Marlborough-Nelson-Westland ..	780,691	86.33	673,963
Canterbury-Kaikoura	3,754,192	99.58	3,738,511
Otago-Southland ..	4,937,406	100.42	4,958,191
Dominion ..	21.505.369	96.48	20,747,741

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for the previous 5 years together with the actual number of lambs tailed:—

Year	Number of breeding ewes (*as at 1945)	Estimated percentage of lambs	Estimated number of lambs	Actual No. of lambs tailed
NORTH ISLAND				
1949 ..	12,033,080	94.55	11,377,076	—
1948 ..	11,821,596	89.43	10,572,444	10,830,868
1947 ..	11,696,313	92.47	10,814,554	11,250,554
1946 ..	*11,890,011	87.92	10,453,719	10,447,857
1945 ..	11,890,011	92.56	11,004,903	11,252,679
1944 ..	11,740,920	90.08	10,576,495	11,054,223
SOUTH ISLAND				
1949 ..	9,472,289	98.93	9,370,665	—
1948 ..	9,233,886	96.93	8,950.202	8,975,017
1947 ..	9,047,469	93.94	8,498,971	8,584,492
1946 ..	*8,975,847	91.69	8,229,713	8,194,441
1945 ..	8,975,847	92.75	8,324.990	8,308,779
1944 ..	8,808,796	94.07	8,286,568	8,399,083
DOMINION				
1949 ..	21,505,369	96.48	20,747,741	—
1948 ..	21,055,482	92.72	19.522.646	19,805,885
1947 ..	20,743.782	93.11	19,313,525	19,835,046
1946 ..	*20,865,858	89.54	18,683,432	18,642,298
1945 ..	20,865,858	92.64	19,329,893	19,561,458
1944 ..	20,549,716	91.79	18,863,063	19,453,306

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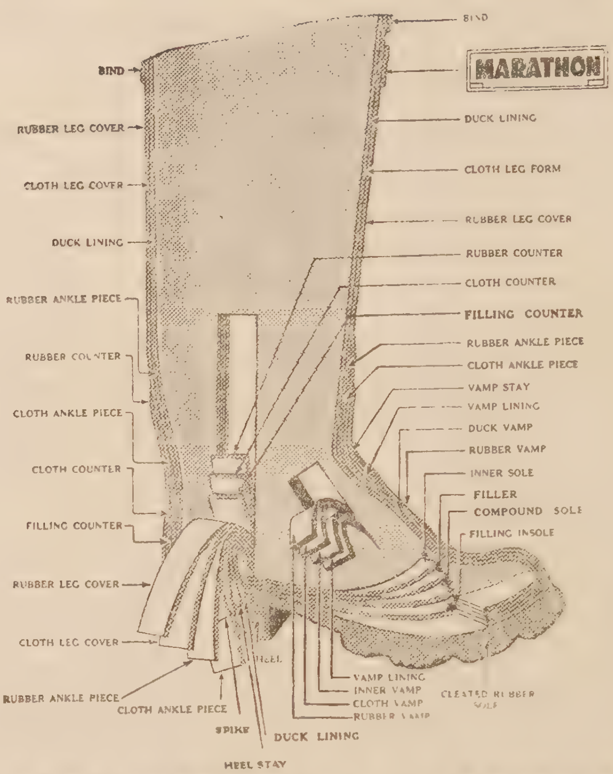
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COBALT SHOULD NOT BE WASTED

By J. F. FILMER, Director of the Animal Research Division, Department of Agriculture, Wellington.

TODAY when cobaltised fertilisers are used so widely it is interesting to recall that topdressing with cobalt was first tried in 1936. When experiments showed that bush sickness could be controlled by applying cobalt, farmers in affected areas quickly adopted the practice. The amount of cobaltised fertiliser used annually has steadily increased until in 1949 it reached the very high figure of 47,000 tons, which would be sufficient to correct cobalt deficiency in 940,000 acres of bush-sick pasture. No accurate records are available of the extent of cobalt-deficient pasture which is regularly topdressed, but it is very unlikely that it approaches this huge area. In other words there is evidence that cobalt is being wasted. This is unfortunate.

ALTHOUGH there is no immediate shortage of cobalt, world supplies are not inexhaustible and the demands of industry and of agriculture in many countries are increasing rapidly. Moreover, most farmers even in these prosperous times are interested in economic efficiency and would not knowingly spend money from which they cannot expect returns.

The facts about cobalt are really quite simple. Sheep and cattle require a certain known amount in their daily diet and if they do not get this they become unthrifty and will eventually die. If they do get the required amount no benefit will accrue from administering additional quantities.

It is therefore important to determine in the first place if sheep or cattle are suffering from cobalt deficiency. The Department of Agriculture's Bulletin No. 180, "Cobalt Deficiency in Sheep and Cattle," gives full details of the method for doing this, but if any doubt exists the nearest Veterinarian or Inspector of Stock should be consulted. Until cobalt deficiency has been definitely diagnosed cobaltised fertilisers should not be used, as in areas which are not deficient in cobalt they possess no advantage over fertilisers which do not contain cobalt and they cost a good deal more.

Fertilisers Preferred to Licks

If cobalt deficiency has been diagnosed it can best be corrected by the use of cobaltised fertilisers which should be used in preference to licks wherever possible. Many farmers, however, apply more cobalt than is necessary.

Where pastures are topdressed annually 1cwt. per acre of a cobaltised fertiliser containing 6lb. of cobalt sulphate per ton should be applied. This rate of topdressing results in the application of 5oz. of cobalt sulphate per acre, which is all that is necessary to correct the cobalt deficiency, and the use of more is just so much waste of cobalt and of money. If more than 1cwt. of fertiliser per acre is required to ensure maximum growth of pasture, the amount over 1cwt. should not be cobaltised. Accurate mixing is not necessary. If, for example, it is decided to apply 2cwt. of superphosphate per acre and the topdresser holds two bags, put in one bag of cobaltised superphosphate at one end of the box and one of plain superphosphate at the other end. It is important, however, that on cobalt-deficient pasture every paddock to be grazed by sheep or cattle should receive 1cwt. of cobaltised superphosphate per acre.

If cobalt-deficient paddocks are topdressed only every other year, they should receive at least 2cwt. of cobaltised fertiliser per acre at each topdressing.

Where regular topdressing is not economic the position is more difficult, but the best method is to apply a dressing of 20oz. of cobalt sulphate per acre, which may be applied in solution or mixed with superphosphate, lime, or even sand. It can be done quite economically by air. Such a heavy dressing will correct the cobalt deficiency for at least 5 years and possibly longer. If it is quite impossible to topdress, cobaltised licks should always be available to sheep and cattle. These should contain at least 4oz. of cobalt sulphate per ton and this amount is contained by all cobaltised licks registered by the Stock Remedies Board.

Correct Diagnosis Necessary

To sum up, if cobalt deficiency is suspected, the aid of officers of the Department of Agriculture should be enlisted in making a correct diagnosis. If cobalt deficiency is not diagnosed, money should not be wasted on cobaltised fertilisers or licks. If cobalt deficiency is diagnosed, cobaltised fertiliser should be applied in the quantities recommended above. The application of quantities in excess of those given will not improve the thrift of either the stock or the owner.

MORE than 21,000 tractors are at work in New Zealand this year, and most of them use petrol as either a starting or a running fuel. Consequently the danger of explosion and fire is ever present if the driver smokes while refuelling a tractor or farm truck. Usually this practice is not deliberate but is the result of thoughtlessness and carelessness. It cannot be criticised too strongly, for not only does the driver lay himself open to serious injury from burns but there is danger to fellow workers nearby. When refuelling operations are carried out in a shed, where still air aids the formation of an explosive mixture with the petrol fumes, there is the added danger of fire destroying plant.

As little as 2 per cent. of petrol vapour with air forms an explosive mixture.

—C. J. CROSBIE, Farm Machinery Instructor,
Department of Agriculture, Christchurch.

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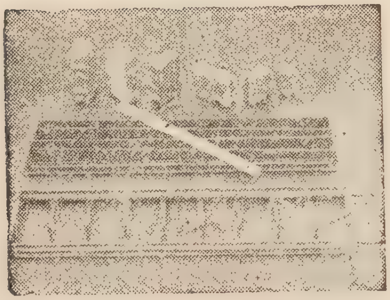

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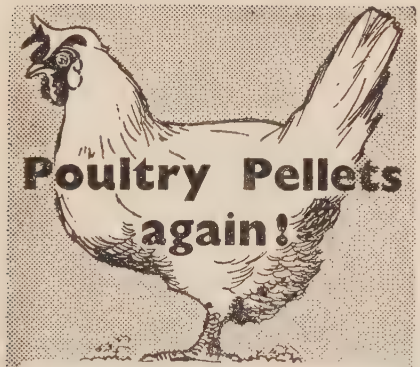

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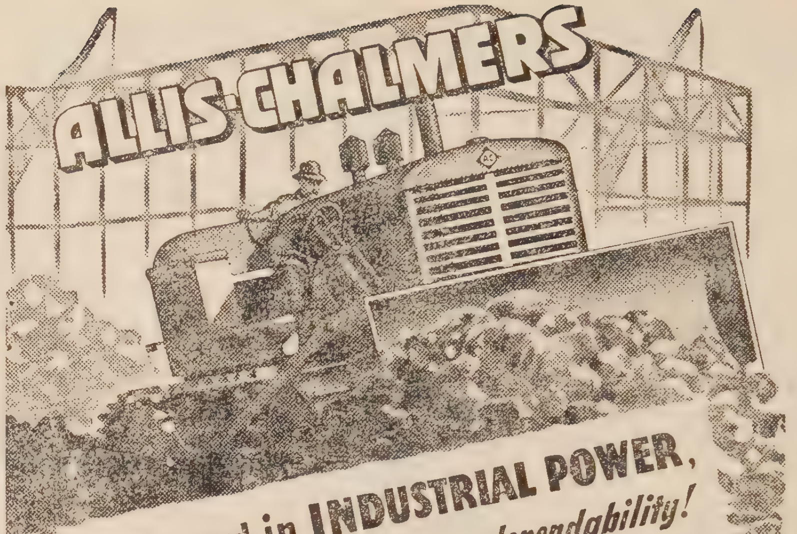

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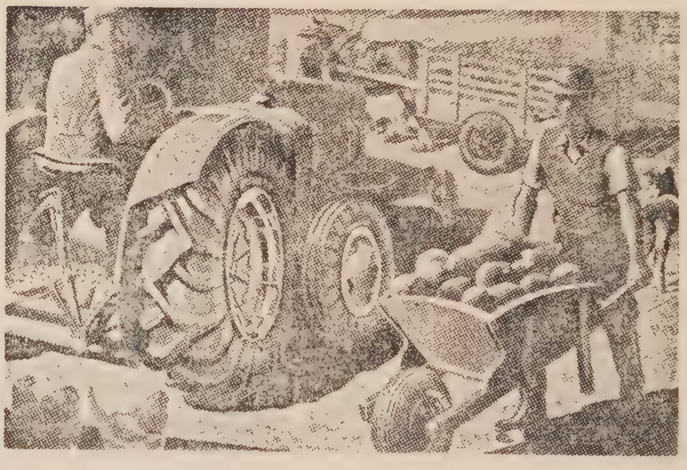

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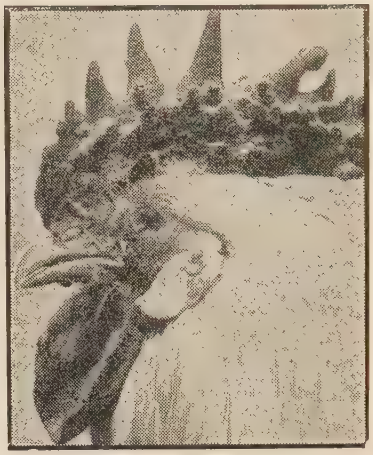
Vaccination of Poultry against Fowl Pox

SYMPTOMS and control of fowl pox were described in an article in the "Journal" of last May, and mention was made of the use of fowl-pox vaccine in the prevention of this disease. Results of trials have been most satisfactory, and limited quantities of fowl-pox vaccine are now available free to commercial poultry keepers from the Animal Research Station, Wallaceville, through Poultry Instructors or Poultry Veterinary Officers. Precautions to be followed in using the vaccine and the method of vaccination are described in this article by R. M. Salisbury, Veterinary Research Officer, Department of Agriculture Animal Research Station, Wallaceville.



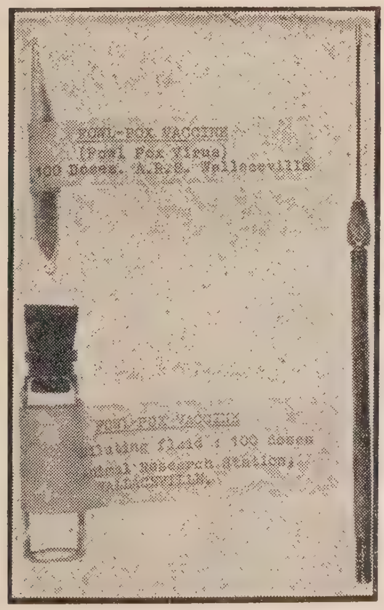
Typical lesions on the comb of a bird infected with fowl pox.

THOUGH the vaccine is highly effective in preventing fowl pox, certain dangers may be associated with its use, and the following recommendations are made to avoid undesirable complications:—

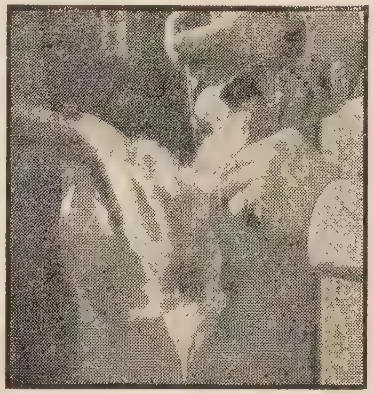
- Fowl-pox vaccination should be carried out only on properties where fowl pox has been diagnosed in previous years.
- Only birds in good health and condition should be vaccinated.
- Only birds between 8 and 12 weeks of age should be vaccinated.
- Birds must be kept under close observation for 3 weeks after vaccination and not subjected to any upsets, such as marked changes in feeding and housing conditions, during that period.

Health of Birds

Perhaps the three most important conditions affecting the general health of birds at this age are heavy worm infestations, greenfeed deficiency, and intestinal coccidiosis. Farmers are therefore advised to treat all birds for worms at 8 to 10 weeks of age by individual dosing with carbon tetrachloride, using an automatic drenching gun. To avoid double handling of the stock they could be drenched for worms and vaccinated against fowl pox at the same time.



The fowl-pox vaccine as supplied by the Animal Research Station, Wallaceville. The station cannot supply needles, but one can be made from a darning needle.



The stab method of vaccinating a bird.

Good-quality greenfeed, preferably chaffed, should be available to birds at all times. If such feed is not available, an oil rich in vitamin A, such as cod-liver or other fish-liver oil, should be fed as supplement in the mash. Many good-quality oils are available, and they should be used according to the manufacturer's instructions.

If these two factors are attended to and other conditions are right, intestinal coccidiosis should never be a source of worry.

Birds older than 12 weeks must not be vaccinated, as older birds may receive a check which will delay egg production or throw them into a moult. Birds up to 12 weeks old are not unduly worried by the vaccination.

The reason for birds being kept under close observation for 3 weeks is that there is usually a systemic reaction on the 17th or 18th day after vaccination, when the birds may appear somewhat dull and off their feed for 24 to 48 hours. They soon recover and no further upsets should occur. In a positive "take" a small scab appears at the site of inoculation on about the 7th to 9th day.

Technique of Vaccination

Farmers intending to carry out fowl-pox vaccination should approach the Poultry Veterinary Officer in Auckland or Wellington or their local Poultry Instructor, who will demonstrate the technique.

The "stab" method, which is both efficient and quick, is the one advised. One vaccinator and three catchers have been nokon to deal with as many as 2000 to 3000 birds per hour. The birds are held by the left leg in one hand and the tail in the other. The vaccinator pulls back the feathers in the skin fold at the back of the thigh and drives the needle right through this fold of skin; plucking feathers is unnecessary.

The needle used is a large darning needle with the tip of the eye pinched off, leaving two prongs. This needle can be mounted on a piece of stick or a cork. Unfortunately, because of the present shortage of needles and the heavy demand on laboratory stocks for the same type of needle for scabby-mouth vaccination in sheep, the Animal Research Station is not able to supply them with the vaccine, but one can be made readily after resort to the housewife's supply of darning needles.

The vaccine is supplied in powder form in a small vial with a bottle of diluting fluid. Just before being used the contents of the vial must be emptied into the diluting fluid and the bottle shaken thoroughly. The bottle should then be held in the left hand (assuming that the operator is right handed) and the needle dipped into the vaccine before each bird is vaccinated. Each bottle supplied contains sufficient for 100 birds.

At present supplies of vaccine are limited, so only commercial poultry keepers will be supplied, on application through Poultry Instructors.

The immunity conferred by fowl-pox vaccination is lifelong and, if the vaccine is used judiciously, excellent results can be expected.

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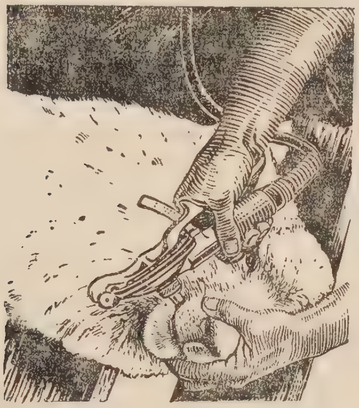

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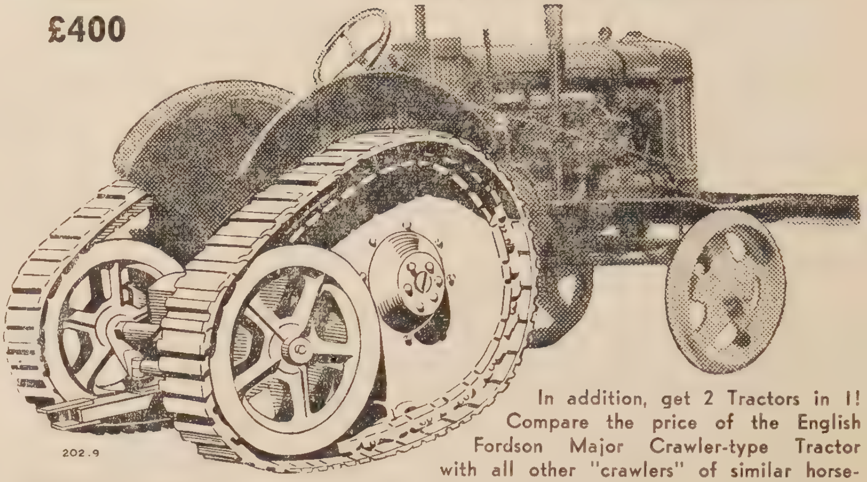

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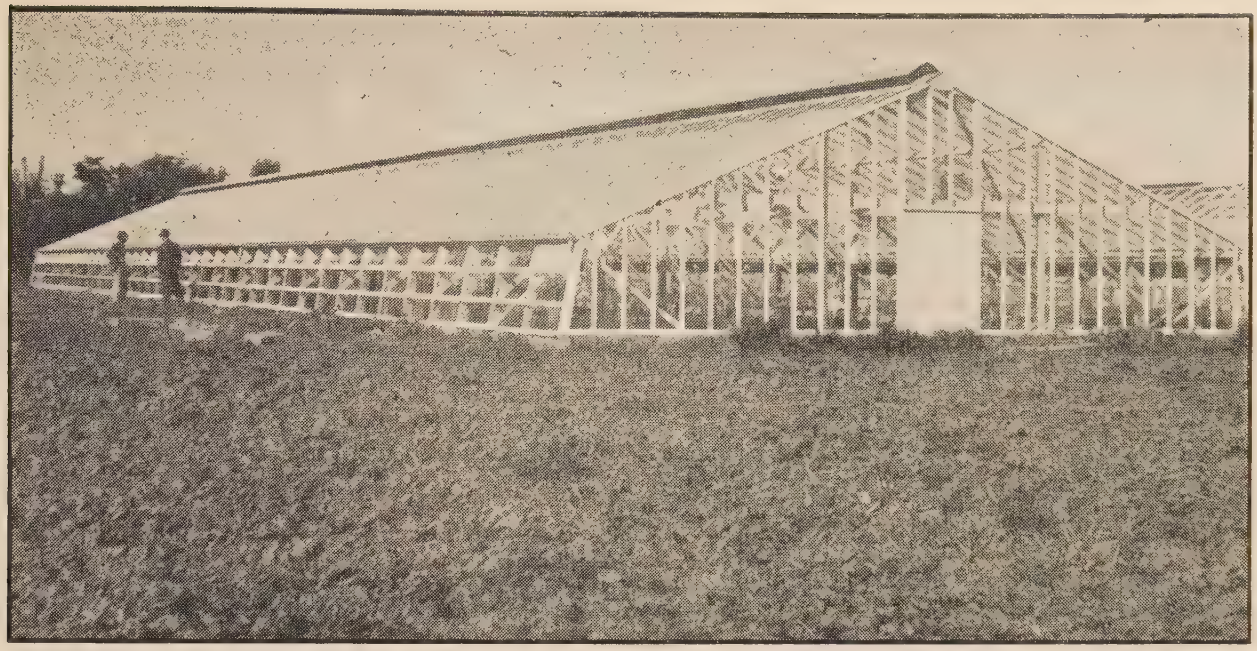

HEADING PHOTOGRAPH: A glasshouse 40ft. wide, which has a framework as shown in Fig. 3, and louvred side ventilators and horizontal glass walls on the principle shown in Fig. 5. Sparrow Industrial Pictures Ltd. photo.

Modern Tomato Glasshouses

By I. L. NOTTAGE, Orchard Instructor,
Department of Agriculture, Auckland.

THE recent very rapid expansion of glasshouse tomato production in the Auckland district has been paralleled by a marked improvement in glasshouse designs particularly suited to this area. Most of the houses constructed within the past few years have been based upon designs similar to the two described in this article and, despite certain inherent disadvantages, wooden frameworks, with inside supporting posts, have been retained.

WHILE modern steel and wood frames have indisputable advantages, all-wood frames are a little cheaper and timber is easier to obtain and to handle where growers want to do as much as possible of their own building. Moreover, the older steel designs had serious faults, and, remembering that, growers are inclined to let "the other fellow" experiment with the new steel designs, which are obviously much better. For these reasons a proportion of the growers probably will continue to prefer wooden-framed glasshouses. The salient features of the newer houses proving most satisfactory at the present are:—

1. Greatly-improved, simple, easily-operated, and very efficient ventilation systems—the most important features in glasshouses designed for the warm, frequently very humid conditions of the Auckland district.
2. Much wider spacing of rafters and the use of the lightest and least possible number of wooden members in the supporting frameworks.
3. High side walls to give ample air space for the plants and, incidentally, more comfortable conditions in which to work.
4. Sloping side walls to allow better air circulation round the sides of the houses and to assist stability.
5. Reinforced concrete posts, giving firm foundations and a rugged basis upon which to build the wooden frames.

The design of all the newer glasshouses is based upon reinforced concrete side-wall posts. They are the foundations as well as the principal wall members and it is upon them that houses depend largely for their stability and strength. The posts are 9ft. 6in. long where houses have sides 6ft. high—the most-favoured height. The posts, which slope inward at the rate of 1 in 6, are sunk 3ft. 6in. in the ground and are further supported by concrete collars (Fig. 1) or by filling the holes excavated to take the posts with concrete instead of the soil which was removed. Perfect alignment of the posts is essential and is perhaps the most difficult part of the job. Bolts to hold wooden members of the framework must be set accurately when the concrete posts are being made. Growers usually mould their own posts.

Concrete building blocks or short concrete posts 5in. x 5in. x 3ft. 6in. are used as foundations for the inside supporting posts, to support end bottom plates, and as intermediate supports for bottom plates between the main side posts. These blocks project about 12in. above ground level.

Bottom plates are about 1ft. above ground level, but on the side walls the exact height of the plates is influenced by the size of panes of glass used. Asbestos board is used to fill the space between the ground and the bottom plate.

Two styles of wooden framework are used. That illustrated in Fig. 2 is suitable for glasshouses about 30ft. wide, while Fig. 3 shows the framework used for houses about 40ft. wide.

Ridge ventilators of the type shown in Fig. 4 are almost always fitted, while side ventilators running the full length of the house are fitted at the tops of both side walls. It is usual to build a sash ventilator above the door at each end of the house.

In the Auckland district satisfactory temperature and humidity control are impossible without side-wall ventilators, but the entry of air through ventilators situated low down in the walls creates draughts, which have detrimental effects on plant growth and on disease control. Two types of ventilators, illustrated in Figs. 5 and 6, provide thoroughly-efficient air circulation without harmful draughts.

Chiefly for reasons of economy glasshouses are being built with rather low-pitched roofs. While it may be claimed that a higher pitch would absorb more warmth from the sun, it has been found that the low-pitched style

MODERN TOMATO GLASSHOUSES

[*Sparrow Industrial Pictures Ltd. photo.*

Side view of 30ft.-wide house, with a framework as shown in Fig. 2, and side ventilators and vertical wall glass as shown in Fig. 6. However, ventilators and ends of rafters are of somewhat modified design, and there is no spouting.

is satisfactory for Auckland conditions and it has the additional advantage of offering less wind resistance. In the houses described here rafters are inclined at from 23 to 25 degrees to the horizontal.

Side walls have been built with vertical studs or with horizontal bearers for glass, the latter method being an innovation, at least as far as Auckland is concerned.

HOUSE 30ft. (APPROX.) WIDE

Most of the details given in this article relate to a house 34ft. wide at the base and 32ft. wide at the eaves, the maximum width for the type. The rafters, which are 18ft. long, are supported at only three points, 9ft. apart—longer spans would be undesirable.

The walls are 6ft. high and the ridge 13ft. 6in. For convenience the house shown in Figs. 1, 2, 4, and 6 is described. It has 5in. x 5in. x 9ft. 6in. main concrete posts, ridge ventilator, upright side-wall studs, and outside, hinged-flap ventilators at the tops of the side walls—features which are interchangeable with those for the wider house. The spacing measurements quoted apply if the glass used is 20in. x 14in. and rafters, etc., are spaced to take the glass the wide way. The timber measurements quoted are for undressed material.

It will be noticed that the 5in. x 5in. concrete posts are set between the side studs and therefore the end posts are not at the corners of the house. That is necessary because the rebated, lower outside edge of the 4in. x 3in. top wall plate (Fig. 7) runs flush with the outer sides of the concrete posts and also flush with the outer sides of the tops of the wooden side studs. The bottom wall plate is attached to the outer sides of the main posts.

When the concrete posts are moulded provision must be made for insetting 9in. x ½in. bolts, projecting 3½in. to take the top plates, and 6½in. x ½in. bolts, also projecting 3½in. for attaching bottom plates.

The concrete posts are set at a slope of 1 in 6 and are 8ft. 10in. apart, measured from the centres of posts. The spacing provides for 5 20in. glass panes, each with ⅛in. clearance, and for the widths of studs less the rebates for glass. The post spacings must be calculated accurately, according to the spacings required for the size of glass to be used, because with this method of construction posts must fall between the wooden side studs.

The inside support posts—4in. x 3in. x 9ft., set on concrete building blocks—are surmounted by 4in. x 3in. plates, which support the rafters midway between wall plate and ridge. One edge of the plates should be bevelled slightly to fit the angle of the rafters. Collar ties 6in. x 1½in. join the tops of alternate pairs of inside posts. The posts are suitably rebated and bolted to the ties.

Angle braces of 3in. x 2in. timber are placed as shown in Fig. 2. There are braces between the centres of collar ties and the ridge and between collar ties and inside posts. Where there are no collar ties the inside posts are braced to the plates which support the rafters. At the ends of the houses 2in. x 1in. roof braces, which are attached to the under sides of the rafters, run at angles from the corners of the house to the ridge (Fig. 2). Similar braces are used at the centres of very long houses. Angle bracing has not been found necessary for the side walls. Spacers 2in. x 1in. are attached to the under sides of the rafters midway between ridge and centre plate (Fig. 4) and between centre plate and eaves.

The ridge plate is 6in. x 1½in., while rafters and studs are 3in. x 2in.

With the exception of those joining the door posts, which are 4in. x 3in., studs are 3in. x 2in. An outside sliding door is shown (Fig. 1) but if desired, the door can be hung inside. Some growers prefer hinged doors of the divided or "stable door" type, as the top half may be opened to admit air while the closed lower half prevents damaging draughts. Others use sliding doors with sacking half doors, or screens, to stop draughts. A hinged or swinging sash above the door is desirable, though it may not be used very frequently.

For a north-south house, the south end is usually of wood, but otherwise similar to the north end; houses sited differently should be glassed at both ends.

Ridge Ventilators

The ridge ventilator shown in Fig. 4 has been used on most of the larger modern Auckland glasshouses. It is a movable ridge of 24-gauge iron which can be raised and lowered on a series of iron connecting bars operated by a lever. A 2in. x 1in. board is rebated into the rafters to leave a space 8in. wide each side of the ridge plate.

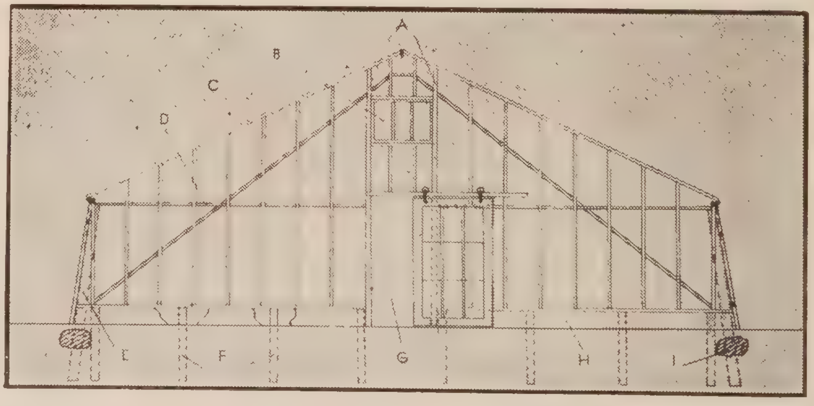

Fig. 1—Front view of 34ft.-wide house (slope of walls, 1 in 6; height, 13ft. 6in.; walls 6ft.). A—Door posts 4in. x 3in. B—Ventilator sash 3ft. 6in. x 2ft. C—Wind brace 2in. x 1in. D—Spacer 2in. x 1in. E—Concrete post. F—Concrete blocks. G—Doorway 6ft. 6in. x 3ft. 6in. H—Asbestos board. I—Concrete collar.

The roof is glazed up to the lower edge of the board. The 24-gauge iron is attached to a wooden centre plate 3in. x 1½in., to which it is braced, at about 3ft. intervals, by 1in. x ⅛in. iron straps. The outer edges of the iron are turned downward to give extra strength and to fit over the 2in. x 1in. board on the rafters when the ventilator is closed.

Pairs of 1½in. x ⅜in. iron bars, which are bolted to the ridge plates of the ventilator and of the glasshouse (Fig. 4) give an 8in. lift before the bars are vertical, so that the ventilator will return to the closed position when the lifting lever is released. The length of movable ridge sections varies according to the over-all length of the glasshouse, but 70 to 90ft. sections operate quite successfully. The centre pair of iron bars in each section is extended downward as far as possible, leaving 6ft. clearance from ground level when the ventilator is lifted.

The lower end of the lever is connected to one of the cross-members of the glasshouse framework with sash cord running through small pulleys. Sections of the ridge ventilator are operated separately and may be set at any level up to the maximum lift of 8in. The ridge is heavy and provided that the lift bars are not raised to the vertical position, it is unlikely to blow over and close the wrong way. In any case, this may be stopped by placing the bars illustrated so that the rafters will check them if they travel too far. A chain (not shown in the diagrams) from the lower end of the long lift bar to a point 8 to 10ft. back along the house ridge plate could be employed as an additional safeguard. At each end of the house and at points where two sections of ridging meet, a short piece (18in. to 24in.) of permanent iron ridging covers the opening to prevent rain entering in windy weather.

If birds are troublesome, ½in. bird netting is needed to cover the ridge ventilator openings; it is rarely if ever necessary on the side ventilators.

Side-wall Ventilators

Details of the outside flap ventilators are shown in Fig. 6, which also shows how the side studs are fitted. The bottom plate is bolted to the outer sides of the concrete posts. The top plate is fitted so that the lower, rebated edge is flush with the outer sides of the tops of the posts. The outer sides of the studs are flush with the lower, rebated edge of the top plate and the outer side of the bottom plate. Thus the studs slope away a little from the concrete posts and the wall glass is kept clear of the concrete. The end stud continues to ground level. The space below the bottom plate is filled with a sheet of asbestos board and the plate is supported mid-way by a short concrete building block.

The ventilator opening is 12in. deep, with a 2in. x 1in. board running along its lower edge. The wall is glazed from the bottom plate to the lower edge of the 2in. x 1in. board, which is rebated into the studs. The ventilator flaps are wooden, 13½in. wide, and hinged at the upper edges to fit

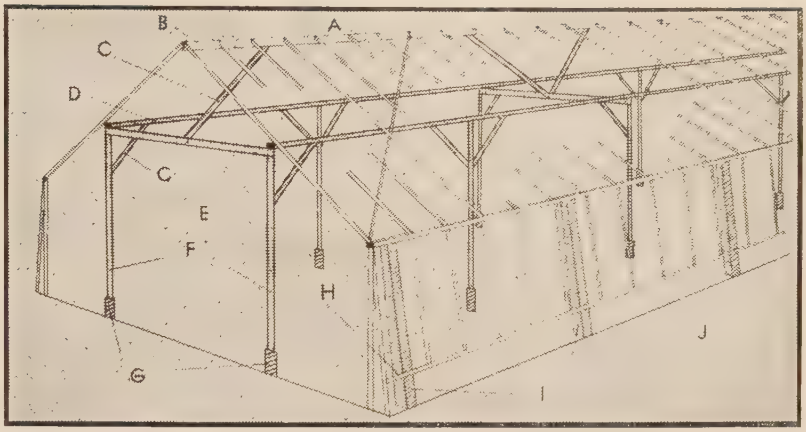

Fig. 2—Framework of 34ft.-wide house. A—Roof brace 2in. x 1in. B—Ridge plate 6in. x 1½in. C—Braces 3in. x 2in. D—Plate 4in. x 3in. E—Collar tie 6in. x 1½in. F—Inside posts 4in. x 3in. G—Concrete blocks. H—Plate 4in. x 3in. I—Concrete posts 5in. x 5in. J—Asbestos board.

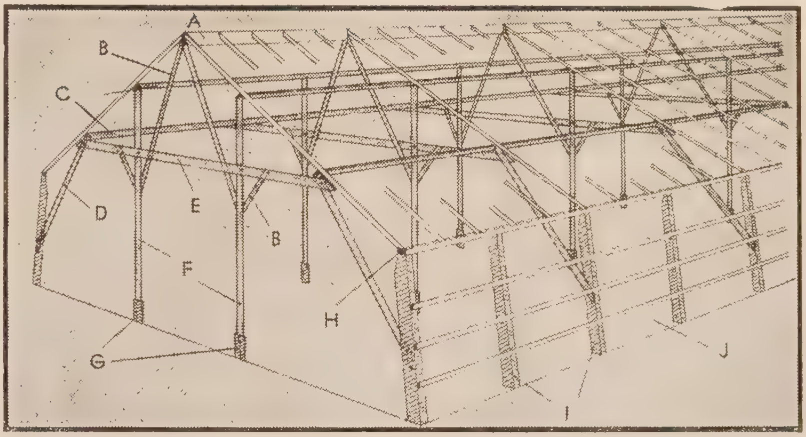

Fig. 3—Framework of 40ft.-wide house. A—Ridge plate 6in. x 2in. B—Braces 3in. x 2in. C—Plates 4in. x 2in. D—Brace 4in. x 2in. E—Collar tie 6in. x 2in. F—Inside posts 4in. x 3in. G—Concrete blocks. H—Plate 4in. x 3in. I—Concrete posts 6in. x 4in. J—Asbestos board.

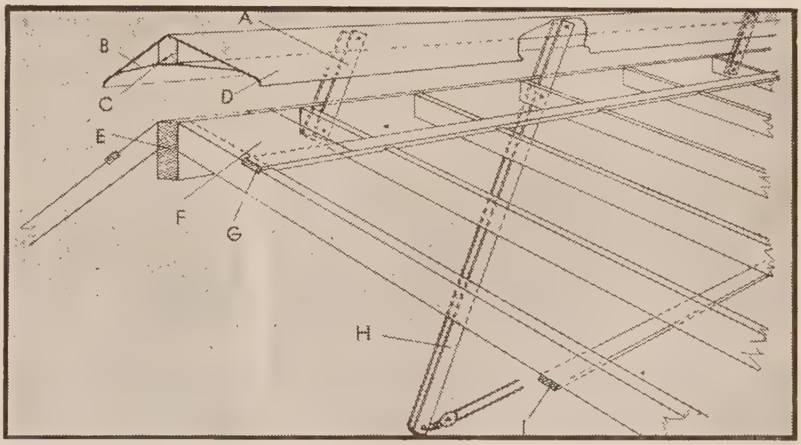

Fig. 4—Ridge ventilator (ridge lift, 8in.; ventilator opening 8in. wide each side of ridge plate). A—Iron lift rods 1½in. x 3/8in. B—Iron straps 1in. x 1/8in. C—Vent plate 3in. x 1½in. D—Iron ridge (24 gauge). E—Ridge 6in. x 1½in. F—Fixed iron ridging. G—2in. x 1in. H—Extended iron lift lever. I—Spacer 2in. x 1in.

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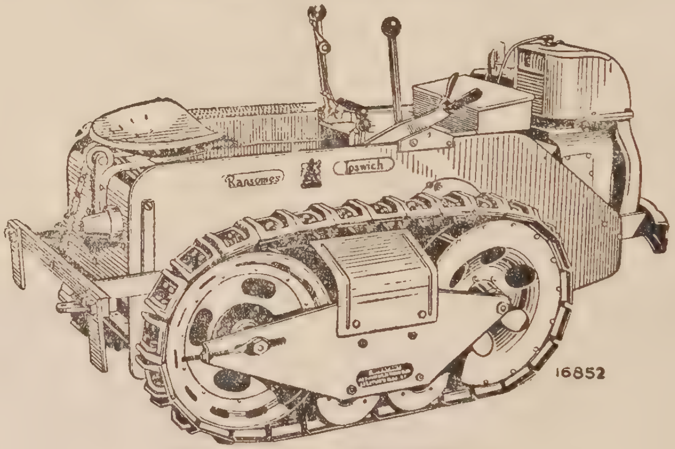

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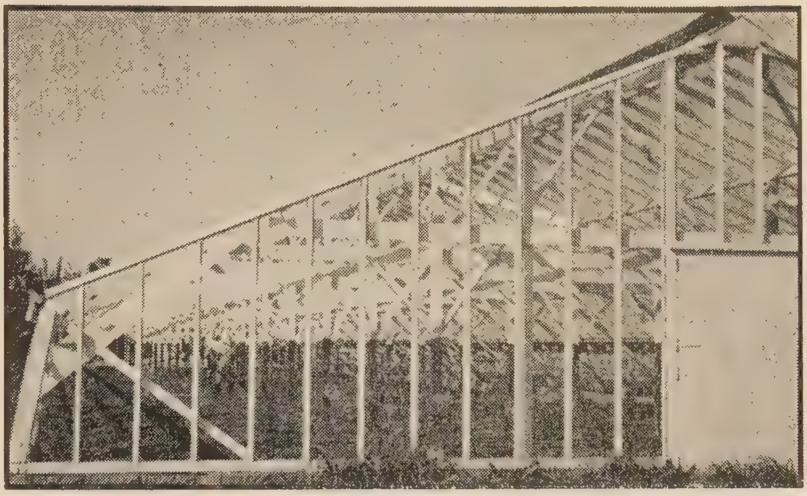
into the 1in. x 1in. rebate on the lower outside edge of the wall top plate. When closed they overlap the 2in. x 1in. board at the lower edge of the opening. The flaps may be in 10 to 12ft. sections, operated individually and controlled by suitable window brackets, or they may be operated simultaneously along the full length of the house by a multiple bracket. In either case ventilator flaps should be designed so that they may be set at any of several points, according to requirements at different times or seasons.

The spouting illustrated in Fig. 6 is of special design. It has a 1in. wide inner flap which slips into slots cut into the ends of the rafters just below the glass. The spouting also covers the gap which would otherwise be left between the top wall plate and the glass of the roof.

It will be noted that the lower ends of the rafters are flush with the outer top edge of the wall plate.



[*Sparrow Industrial Pictures Ltd. photo.*

End view of a 40ft.-wide house. Hinged half doors have been used.

HOUSE 40ft. (APPROX.) WIDE

The details set out here are for a glasshouse 40ft. wide at ground level, with walls 6ft. high, and ridge 14ft. high. This gives a slightly lower pitch than in the 30ft. house. (Features shown in Figs. 3, 4, and 5, including 6in. x 3in. main concrete posts, horizontal bearers for side-wall glass, and louvre ventilators at the sides, can be used for the 30ft. house also.)

Reinforced concrete posts 6in x 3in. x 9ft. 6in. are more suitable for the 40ft. house than the 5in. x 5in. x 9ft. 6in. posts previously described and the tops should be shaped (Fig. 5) to allow for the inside ventilator flaps. The inside bevels at the tops of the posts commence 3in. from the outer edges (half the width of the posts) and the bevels are 6in. long. This leaves a 3in. bearing surface for the top plate and a 6in. opening for the ventilator. The top plate (Fig. 7) is fitted so that the rebated lower outside edge is flush with the outer top edges of the concrete posts. The plate is bolted to the tops of the posts as described for the 30ft. house.

When the posts are moulded provision must be made for insetting 9in. x ½in. bolts at the top and also 7in. x ⅜in. bolts projecting 2½in. to take the specially-cut wooden members shown in Figs. 5 and 7, which are cut

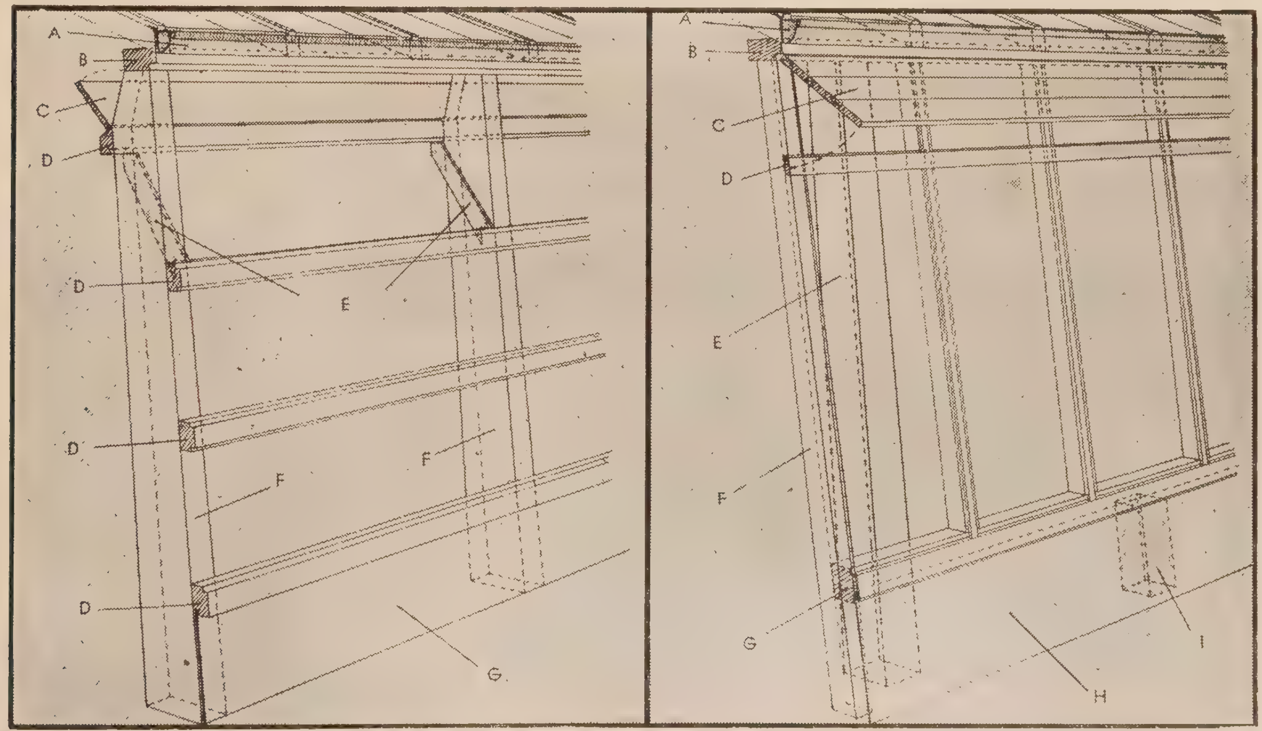


Fig. 5 (left)—Louvre ventilator and horizontal wall glass. A—Spouting. B—Plate 4in. x 3in. C—6in. hinged shutter. D—3in. x 2in. E—3in. x 1in. supports for sloping glass. F—Concrete posts 6in. x 3in. G—Asbestos board. Fig. 6 (right)—Flap ventilator and vertical wall studs. A—Spouting. B—Plate 4in. x 3in. C—Side flap ventilator 13½in. D—2in. x 1in. E—Concrete main post 5in. x 5in. F—Corner stud 3in. x 2in. G—Bottom plate 4in. x 3in. H—Asbestos board. I—Concrete block.

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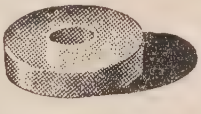

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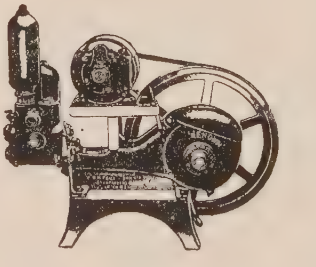

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Louvred Side-wall Ventilators

The top board is attached to the inner sides of the concrete posts (Fig. 5) with its upper edge flush with the lower edges of the bevelled tops of the posts. The remaining three horizontal pieces are placed in the order and positions illustrated and are spaced according to glass measurements, leaving the bottom plate about 12in. above ground level.

The wooden ventilator flap, which is 6ft. wide, is hinged at its lower edge to the inside board at the bottom of the bevel. It opens inward, being controlled by suitable brackets.

From the rebated, lower edge of the inside horizontal board glass panes slope downward and outward to the rebated, upper outside edge of the top horizontal member on the outer sides of posts. The glass, which should be 20in. to 24in. long, if possible, is carried by the rebates in the timber, but sloping wooden supports are provided beside the concrete posts, chiefly to enable the joins to be sealed. This method provides stormproof and efficient side ventilators which do not cause draughts.

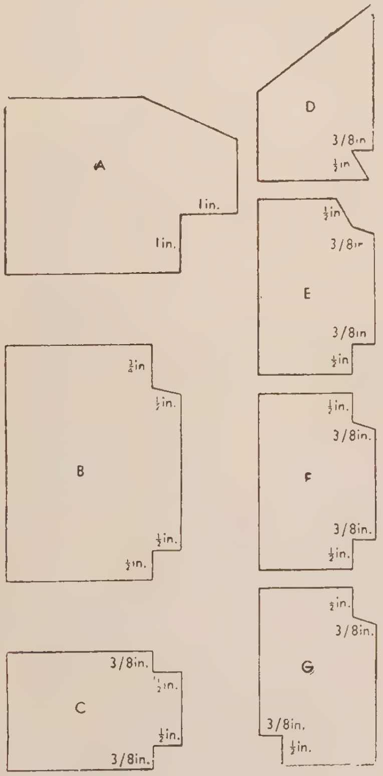
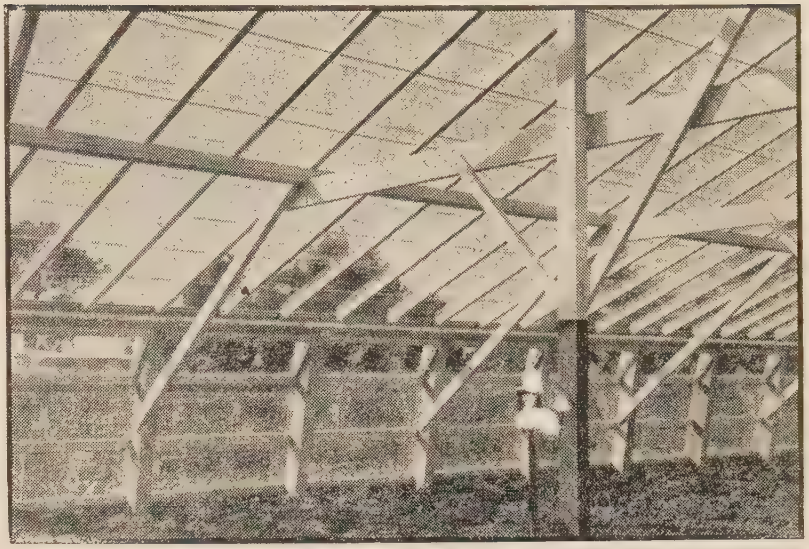


Fig. 7—End sections of rebated members. A—Top wall plate 4in. x 3in. (Figs. 5 and 6). B—Bottom plate 4in. x 3in. (Fig. 6). C—Rafters 3in. x 2in. D—Inside 3in. x 2in. (Fig. 5). E—Outside 3in. x 2in. (Fig. 5, upper). F—Outside 3in. x 2in. (Fig. 5, middle). G—Outside 3in. x 2in. (Fig. 5, lower).



[*Sparrow Industrial Pictures Ltd. photo.*

Inside view of part of the framework of a 40ft.-wide house (Fig. 3). The louvred, side-wall ventilators are slightly different from those shown in Fig. 5.

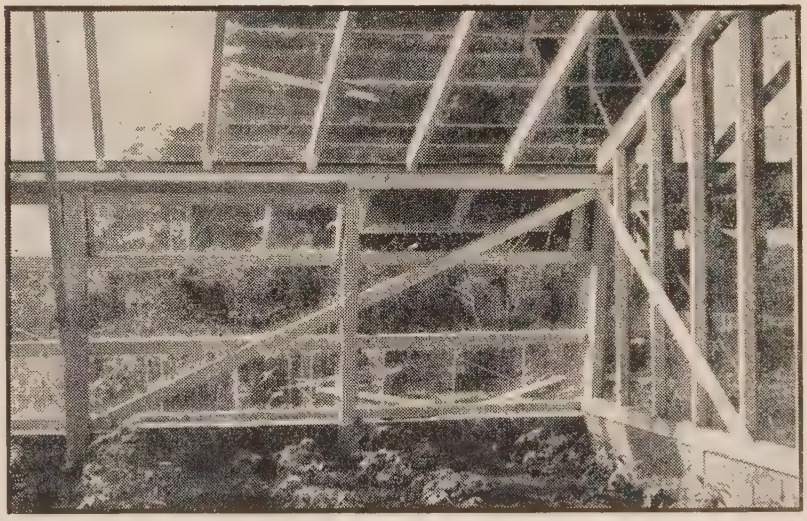
The remaining two lower members are spaced to take the size of glass to be used. The glass is laid in two long horizontal strips instead of between vertical studs—the more usual manner.

The ridge ventilator is the same as that previously described (Fig. 4), while the ends of the house are similar to that shown in Fig. 1, but modified to suit the extra width of the house.

Main Frame

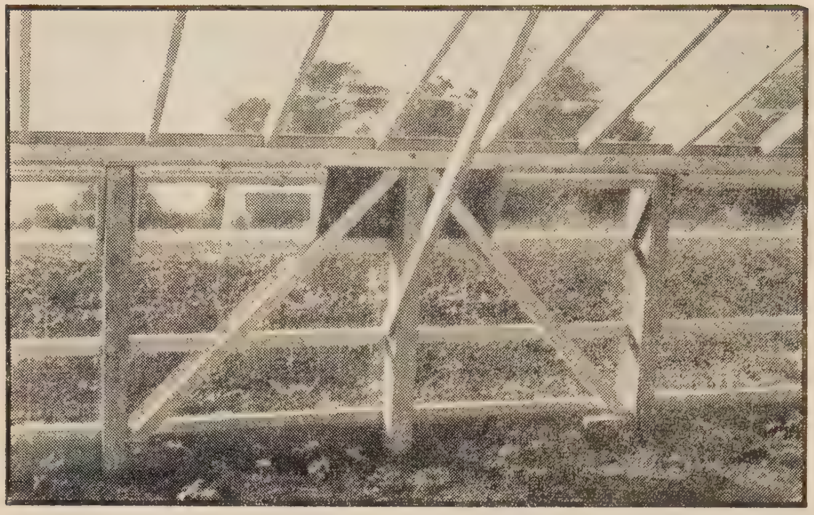
The main framework of the 40ft. house is shown in Fig. 3, but because the glass is laid horizontally on the side walls, spacing of reinforced concrete posts is entirely independent of glass measurements. As there are no vertical side studs to assist in supporting the top-wall plates and as the extra width of the house calls for additional strength in the principal supports and foundations, concrete posts are placed 4ft. 6in. apart.

Pairs of inside posts are 9ft. apart, corresponding with alternate pairs of side posts. The rafters, which are 20ft. 6in. long, are supported at two intermediate points, giving three equal spans. This is accomplished by placing the 4in. x 3in. inside posts on concrete foundations so that they carry



[*Sparrow Industrial Pictures Ltd. photo.*

Corner braces were used in this 40ft.-wide house. Experience in other houses indicates that they are not essential, and they do interfere with the louvre-ventilator system. In the house illustrated the two end posts are of totara, on a concrete foundation, to facilitate use of the braces. A hinged-flap ventilator is used in the end section.



[*Sparrow Industrial Pictures Ltd. photo.*
Wall braces at the middle of a long house; these are of doubtful value. Note the independent frames for louvred side ventilators.

a 4in. x 2in. plate to support the rafters at a point one third of their length from the 6in. x 2in. ridge. The tops of the posts are cut to take the 4in. x 2in. rafter supports at the correct angle for the rafters to bear upon their upper, 2in. sides.

A 6in. x 2in. collar tie, projecting at each end to carry the second 4in. x 2in. intermediate rafter support, is bolted to each pair of inside posts. The rafter support is further strengthened by a 4in. x 2in. angle brace, which is bolted to a concrete side post and to the end of the collar tie. Additional 3in. x 2in. angle braces run from the ridge plate to points below the collar ties on the inside 4in. x 3in. posts. The outer sides of the latter posts are braced to the collar ties by short 3in. x 2in. braces. Roof braces of 2in. x 1in. timber (Fig. 2) are used. There are also four pairs of lengthwise braces not shown in the diagrams. From points on the collar tie 3ft. on either side of each end inside post pairs of 4in. x 2in. braces run inward and upward, converging to meet near the top of the second inside post, where they are attached. (These braces could not be shown clearly in the diagrams without making them too complicated.)

Angle braces may be used in the side walls, but it is doubtful if they are necessary with so many sturdy reinforced concrete posts to take the strain, and they interfere to some extent with the sloping glass louvres of the ventilation system. In some houses—including the 30ft. type—having fewer concrete posts no wall braces are used nor do they appear necessary.

GENERAL CONSIDERATIONS

In constructing a glasshouse all level wooden surfaces should be bevelled slightly to allow condensed moisture to run off readily. However, in the houses described all members are inclined because side wall posts slope inward, and it is not necessary to do the bevelling.

Oregon pine is the most suitable timber for glasshouse construction and should be used if possible, especially for rafters and studs which are to be rebated to carry the glass panes.

All timber should receive a coat of priming paint before being erected or at least before the glass is laid. The under coat and subsequent coats should be applied after laying the glass, and will help the putty to seal the joints between glass and timber. The finishing coat should be white.

Because of trouble arising from corrosion due to the moist conditions inside tomato houses, galvanised nails and bolts should be used. Copper nails are even better, but are very difficult to obtain. Brass brads with small heads are used to hold the glass in position.

Large glass panes—up to 24in. long—are recommended, with rafters, etc., spaced to take them the wide way, as it is surprising how much difference this arrangement makes to admission of light and warmth. Glass panes should not be overlapped more than ¼in.

The spraying of glasshouse roofs with a protective wash in very hot weather is more likely to be necessary with a new house than with an old one, as new glass is very clean and clear.

Moisture courses should be used in all wood-to-concrete joins.

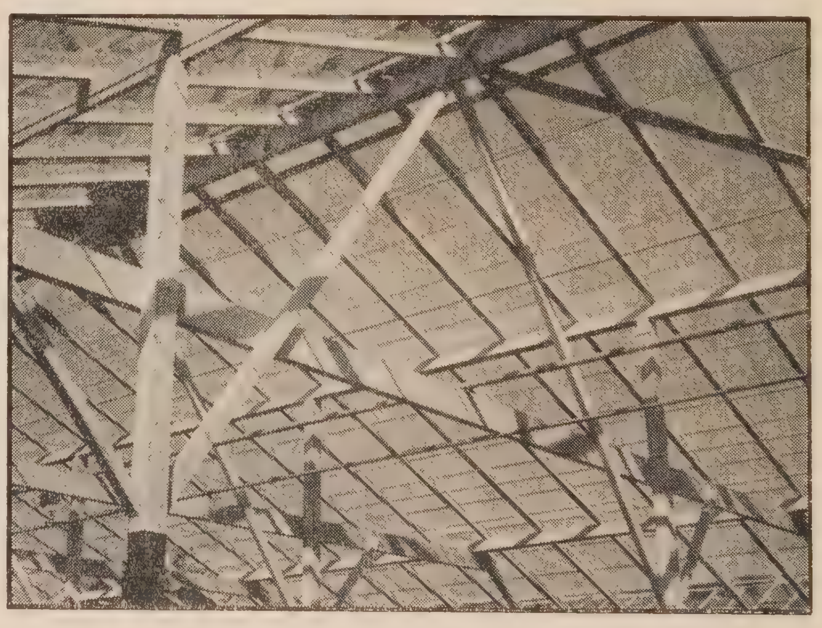
Water pipes and spray pipes (if a stationary spray plant is used) may be suspended from the cross-members of houses, above the centre pathway. With suitably-spaced taps for hoses overhead piping systems are handy and are out of the way when not in use.

Glasshouses should be built in positions where the soil is well drained or can be drained. Spouting should be used or concrete gutters should be provided along the outsides of side walls to carry away surplus water.

Houses should be built where they can be reasonably well protected from winds, especially cold winds—a well-favoured section without glass is almost as good as a badly-sited one under glass and is a great deal less expensive.

Acknowledgments

The glasshouses described and illustrated are not exact descriptions of particular buildings—the designs given combine the best features of a number of houses. The author wishes to acknowledge the assistance given by Auckland glasshouse tomato growers, especially Messrs. A. C. Mann, E. E. B. Wood, F. W. J. Jennings, and H. R. Lupton.



[*Sparrow Industrial Pictures Ltd. photo.*
Looking upward near the middle of a 40ft.-wide house. Note the water and spray pipes carried, respectively, above and below the collar tie.

THE OPERATION AND MAINTENANCE OF A HEADER HARVESTER

ON all farms where grain and seed crops are grown the harvesting of these crops is a very important operation. There is a saying that a crop cannot be judged until it is in the bag, and certainly the return from many crops has been lessened appreciably by mistakes made during harvesting. This article by C. J. Crosbie, Farm Machinery Instructor, Department of Agriculture, Christchurch, describes the mechanism of the latest gift of science and invention to this branch of farming, the header harvester, and recommends methods of adjusting, operating, and caring for the machine to obtain the best results from it.

NOT so many years ago the direct responsibility of the farmer ended before a grain or seed crop was threshed. The stooking or stacking of a grain crop or the cocking after windrowing of peas or grass seed was the duty of the grower, but in most cases the threshing was undertaken by contractors. The large wooden combines and to a less extent the smaller tin mills were machines capable of threshing the produce of a large acreage and were best utilised by contract operators who travelled from one farm to another.

Until the mill arrived the unthreshed crop was held either in stooks or cocks or in stacks, depending on the farmer's judgment of when the mill would arrive. Naturally, the man in charge of the mill—frequently the owner—had a very good knowledge of the machine he was working and was able to handle it to best advantage under a very wide range of conditions.

The introduction of header harvesters brought a marked change in harvesting operations. The header harvester has not the same capacity as either a combine or a tin mill, but can combine the operations for which two machines were previously necessary. Though some header harvesters are operated on a contract basis, they are designed primarily for operation by the farm staff, as are most other farm implements. Though in some ways they may work under a narrower range of conditions than older types of threshing machines, they have emphasised the necessity for the closest judgment in determining whether a crop is fit to be harvested.

On the other hand, the experience which can be gained by a farmer using his own equipment is restricted in comparison with that to be gained by a contract operator of a threshing mill, and therein may lie the reason for the criticism of header harvesters which is sometimes heard.

Purpose of Threshing

The essential aim of any threshing operation is to remove the seed or grain from the straw as cleanly as possible, at the same time doing the minimum of damage to the grain or seed and not breaking up the straw and other impurities so that dressing the crop becomes more difficult. The removal of impurities from the grain or seed is of secondary consideration.

From observations by officers of the Department of Agriculture, the most important factor affecting the efficiency of a header harvester appears to be the condition of the crop, the setting of the machine being next in importance.

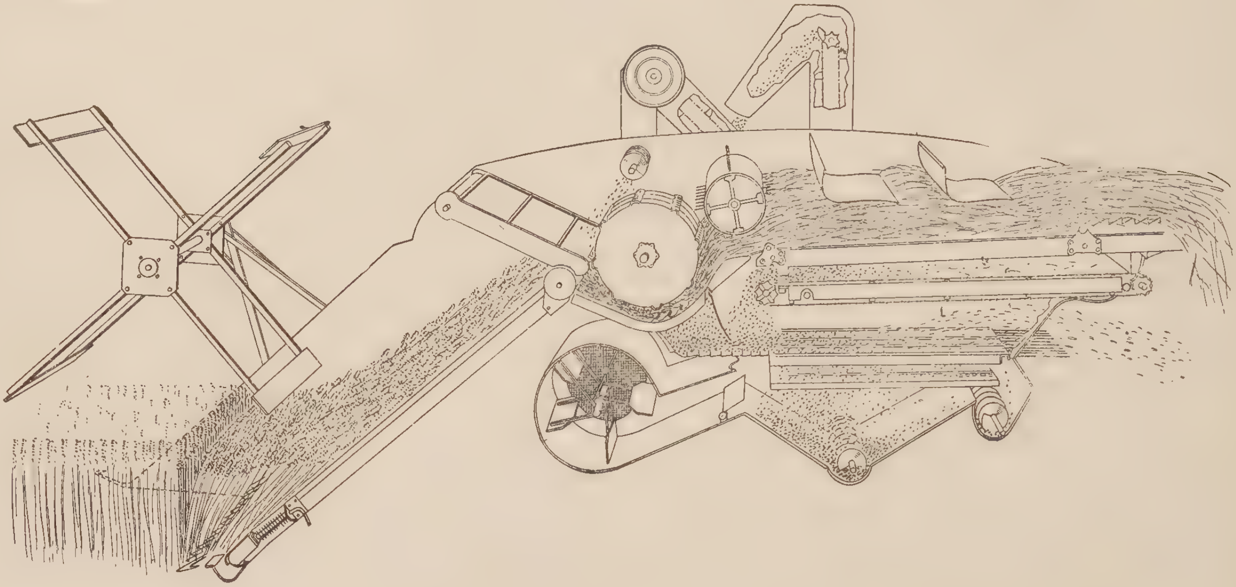
Further work is being undertaken in an endeavour to define more clearly the nebulous term "in condition for threshing," though many header harvester operators have been able to determine by experience and to their own satisfaction what this term means. In the meantime this article gives some advice about the setting of the header harvester to enable it to perform its best work.

Mechanisms of a Header Harvester

Seen for the first time a header harvester appears to be a very complicated piece of machinery, whether it is a modern self-propelled machine with up to 24 forward speeds or the more common trailer-drawn type, driven either by an engine or from the power take-off shaft of the tractor. However, when stripped to its component parts it proves to be a machine which can be understood readily and the work of which can be appreciated even by those who have never operated such a machine.

Apart from the engine or engines which provide power to drive its mechanisms and to propel it, a header harvester consists essentially of a wheeled chassis on which are mounted mechanisms for cutting and elevating, threshing, separating, and seed cleaning.

THE MECHANISMS OF A HEADER HARVESTER



A cutaway diagram of a header harvester showing the cutting, threshing, separating, and cleaning operations that take place in a modern machine.

Cutting and Elevating Mechanism

The crop to be harvested is either direct headed, in which case the seed head is cut from the remainder of the plant by a mower bar mounted on the front of the header, or picked up from a windrow after being cut previously by a mower, binder, or windrower.

The cutting mechanism of a header harvester is essentially the same as that on a mower except that the sections on the knife are usually serrated and the ledger plates plain. For special crops of a fibrous nature that cause blockages at the knife plain sections similar to those on a mower are used.

The pick-up for crops that have been windrowed may be one of two types—either the rotary-drum type with sets of revolving spring-steel fingers which disappear down between guards at the top of the lift, or the draper type with rows of steel fingers embedded in channel-steel slats on a revolving canvas.

In all cases the crop is passed on to an elevating mechanism for delivery to the drum. The elevator may be either a steel slatted conveyer chain or a rubberised-canvas draper. It may be the full width of the cutter bar or the crop may be concentrated into a more bulky swath by augers or a cross-conveyer belt for delivery to a narrow elevating mechanism.

The Threshing Mechanism

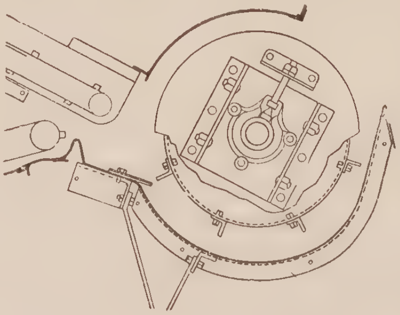
The cut, unthreshed crop is fed into the drum, where the grain or seed is threshed out of the heads by being passed between a rapidly moving cylinder and the shelling plate and later the concave. The speed of the cylinder is variable through a wide range to meet the needs of different crops and conditions, as is the clearance between the cylinder and the shelling plate and concave.

On entering the drum the grain first passes over the shelling plate, where it receives its first impact from the bars on the cylinder; here most of the threshing is done. The cylinder bars may be of the peg-tooth type or the rasp-bar type, or they may be faced with rubber vulcanised to the bars.

After passing the shelling plate the crop passes over the concave, which may be of the open or closed type, depending on whether any separation of the seed from the straw takes place here. The concave is fitted with devices which obstruct the flow of straw and so ensure complete threshing. Depending on the type of bar fitted to the cylinder, these devices may be peg-toothed bars, rubber-faced bars, or of the rod type, and provision is made for the removal of some of them if conditions make that necessary.

Separating Mechanism

The seed and straw pass from the drum on to straw walkers or straw shakers, which shake the seed from the straw so that it falls on to the seed tray before being passed to the cavings riddle, while the straw is passed to the exterior of the machine. The material reaching the cavings riddle consists of seed, long and short pieces of straw, seed heads (either threshed or unthreshed), pieces of grass or flag, and other small portions of vegetation.



The cylinder bars, shelling plate, and concave bars between which threshing is carried out.

The cavings riddle is adjustable so that the straws and larger material pass over and fall to the ground. An adjustable blast of air blows up through the cavings riddle and the tail of the machine. Unthreshed grain and parts of full heads are retained by a device at the end of the cavings riddle and, after being collected in a tray, are cross-augered, carried up in the gleanings elevator, and returned to the drum for rethreshing. Seed passing through the cavings riddle is delivered on to a set of seed riddles, which may be either replaceable or adjustable for different crops, and here again material which does not pass through them is caught in the tray and returned to the drum.

Seed-cleaning Mechanism

From this last riddle the seed is collected in another tray, cross-augered, and raised in the grain elevator to the screen for cleaning. The screen may be replaceable with others having different-sized holes or slots for different crops, or it may be of the adjustable wire-screen type.

In either case the aim of this mechanism is to remove some of the weed-seed impurities and to separate the seed into first and second grades if required.

Operation of the Machine

A recognition of the proper time to start harvesting is essential for the successful operation of a header harvester. All too often a farmer tends to start the machine in a field before the crop is fit for threshing, and this is more common where a crop is to be direct headed than where it is to be picked up out of the windrow. The ability to decide when a crop is to be harvested can come only after much experience, and in practice the decision is made after such field tests as sweeping ryegrass with a hat or biting grains of wheat. Farmers who do not feel qualified to make such an important decision can obtain advice from neighbouring experienced farmers or from officers of the Department of Agriculture.

If there is doubt whether the crop is fit for harvesting, samples of wheat may be sent to the Wheat Research Institute or its substations for moisture determinations; results of tests are quickly communicated to the farmers concerned. In general it is not advisable to direct head wheat with a moisture content of more than 16 per cent.

If the crop is fit and the weather right, the header harvester may be brought into operation, and whether the machine does poor, fair, or good work will depend entirely on how well the operator knows his machine and the principles of the adjustments that have been built into it and whether he applies his knowledge. The header harvester has been evolved to combine in one machine four operations of harvesting that were previously done separately, and its components are variable so that each may be fitted to handle the flow of material from the previous one. Further, though a machine may be made to perform efficiently under one set of conditions, where the conditions vary from crop to crop, from day to day in one crop, and even during one day in the same crop, as they do when harvesting with a header harvester, the parts of the machine must be variable to allow for those varying conditions. To understand the adjustment of these parts and to apply such knowledge to the conditions of the crop being harvested is the secret of successful and efficient heading.

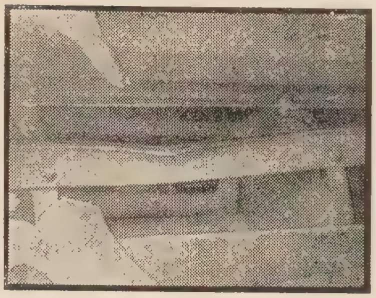
The adjustments of the header harvester include the following:—

Flow Control

The flow of material entering the drum is one of the factors affecting threshing and may be controlled in one of several ways:—

If the crop is windrowed and picked up, the windrow should be even along its length and of such a size that it can be handled by the machine. Too big a windrow makes for inefficient threshing, and seed still in the ear is dumped on the ground. Again, if the windrow is too bulky, seed may not be shaken out of the straw as it passes over the straw shakers and so is lost on the ground. Too small a windrow, on the other hand, causes hard threshing and damage to the seed.

Speed of travel is important, as the rate at which the windrow is fed into the drum has just as great an effect as the size of the windrow, because the same factors operate. Driving too fast leads to overloading the drum, resulting in threshing losses and carry-over of seed from the straw walkers. That speed is important has been realised in the past, for some farmers have had special double gearboxes fitted to their tractors so that lower and intermediate gears not provided by the tractor manufacturers could be used. Of recent years new self-propelled header harvesters have been fitted with variable sheaves in the drive power line so that up to 24 forward speeds are available.



Even a small stone can cause such damage as this to cylinder bars when it is picked up with the windrow. Bent cylinder bars cause incomplete threshing and should be straightened or, if the damage is too great, replaced.

If the crop is being direct headed, the problem is easier because less straw is taken from the plant and therefore more heads may be put into the flow of material to the drum. However, practice is needed before the operator can distinguish the even rhythm characteristic of a well-fed drum operating at maximum efficiency without either overloading or running partially full.

Operation of the Drum

The sole function of the drum is the threshing of the seed from the seed head, and this is controlled by two adjustments, both of which are of primary importance. The mishandling of either or both can spell failure of the whole operation.

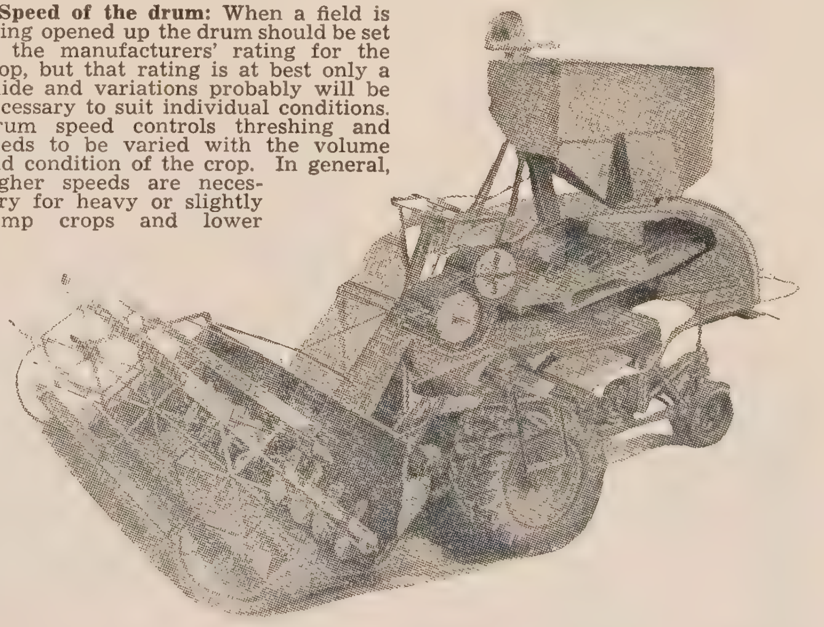
Speed of the drum: When a field is being opened up the drum should be set at the manufacturers' rating for the crop, but that rating is at best only a guide and variations probably will be necessary to suit individual conditions. Drum speed controls threshing and needs to be varied with the volume and condition of the crop. In general, higher speeds are necessary for heavy or slightly damp crops and lower speeds for light or dry crops, but too high speeds lead to seed damage and excessive chaffing of the straw.

Setting of the concave: The peg type of drum is adjusted by altering the number of pegs on the drum and the number of rows of pegs in the concave, those taken out being replaced with blanks, and by using different sizes and shapes of pegs for different crops. The centring of the pegs of the drum between those of the concave is important. The adjustment in the beater type of drum is the distance between the drum and the concave; in some machines the concave and in others the cylinder is adjustable up or down. The adjustment of the shelling plate is also important and, if required, concave bars may be taken out. As for the drum speed, the manufacturers' recommendations for concave settings should be used as a guide when starting a field, but they may require alteration to suit the conditions.

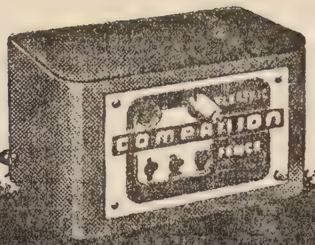
With the drum and the concave set as suggested, the straw should first be examined for seed left in the heads. If they are present, an increase in drum revolutions is indicated, and if the machine has a shelling plate, an adjustment there might be necessary. In general, increasing the drum revolutions is a safer method of improving threshing than closing the concave settings, for knocking the seeds out of the head by impact from the cylinder bars is safer than rubbing them out between the cylinder and the concave.

Then the sample of threshed seed should be examined for cracked, broken, or excessively skinned seed. If damage is present, the concave requires to be opened or the drum speed reduced. If there is excessive chaff and straw on the cavings riddle, the fault is in too close concave settings or too high drum speeds.

If the humidity alters during the day, alterations to the drum settings will be necessary, and it should be a



This sectional drawing of a modern self-propelled header harvester shows the relationship of the components described in this article.



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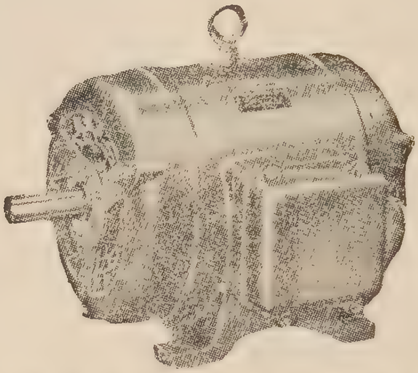

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general rule to check the machine during the day to determine whether alterations should be made.

Cavings Riddle

The cavings riddle is adjustable to allow the seed to fall through it and the straws and unthreshed heads to pass over it while a blast of air comes up through it to remove chaff and light matter. If threshed seed is passing over it and being returned to the drum, the riddle needs to be opened, but not so far as to allow straws to pass through it, or the blast may be too vigorous and may be blowing the seed over the riddle. In general, the aim is to have the flow of material floating over the cavings riddle so that the seed is on the bottom and the light material held above it by the blast.

The tailings attachment is an extra fitting which may be added to the cavings riddle to increase its area and bring about better separation under more difficult threshing conditions. The attachment is adjustable. Unthreshed heads pass over the cavings riddle and its attachment and return to the drum for rethreshing.

The Blast

The blast of air used to separate the chaff, husks, and light material from the seed is produced by a fan operating at constant speed but with either adjustable inlet or discharge gates or both. The strength of the blast is adjusted to suit conditions in the field so that a clean sample of seed is obtained.

However, when high-grade small seeds are being harvested it is probably better to reduce the blast so that all the seed and some inert matter is bagged than to blow off the inert matter and some of the seed with it. Seed-cleaning firms have specialised plants and can clean up a line of seed more economically than can a farmer with a header harvester. The return from seeds that he will blow over the riddles of his machine usually will more than pay a firm to clean out the inert matter he is trying to get rid of.

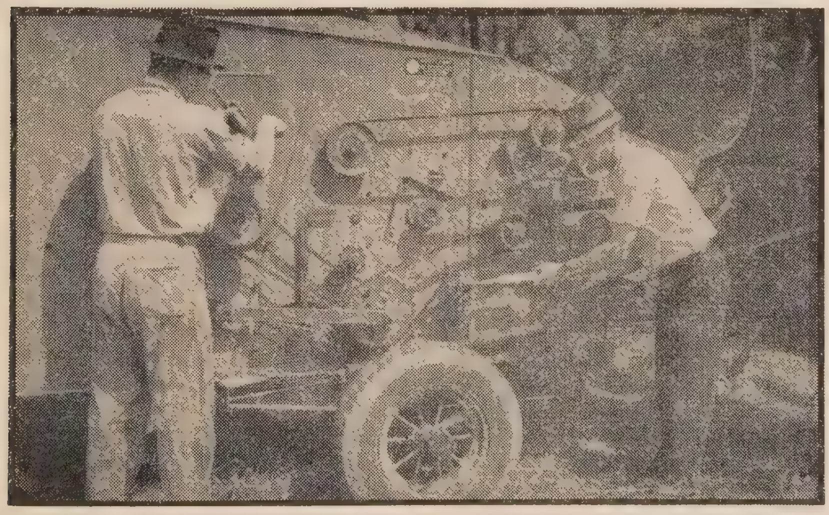
When a crop is being headed in a strong wind the blast requires frequent attention as the machine moves round the field to compensate for the direction in which the wind is blowing into the harvester.

The Riddles

An adjustable riddle or a replaceable one with holes or slots suited to the crop is fitted under the cavings riddle, and seed passing through this riddle is led to the screen. The purpose of this riddle is further cleaning of the sample, and if the operator of the machine is so proficient that he is obtaining a clean sample off the cavings riddle, as is possible sometimes with grain and linseed, this last riddle may be left out; however, if there is any trace of inert matter, it is better left in to obtain a clean sample.

If too great a quantity of crop is being handled by the machine, the riddle may become overloaded and some threshed seed may pass over it to return to the drum, where it is rethreshed, so increasing the possibility of damaged seed. The remedy in this case is obvious.

The ploughing in of grain stubble is always difficult, and that is particularly true with rows of headed straw. To overcome this many header harvesters are fitted with straw spreaders, which spread the material over a wide area and make it easier to plough in.



As they work at high speeds under dusty conditions, the moving parts of the header harvester require adequate and regular lubrication.

For efficient riddling the material must pass over the full width of the riddles in an even stream, and to aid this the riddles must be level. On flat fields the height of the drawbar of a trailer-drawn header harvester must be set so that the riddles are level. If the nose is low, the seed moves to the front of the machine so that it comes on to the riddles in a thick stream, uses only a portion of the riddle area available, and as a result overloads it.

For operation on hillsides self-levelling devices are fitted to header harvesters so that their riddle boxes are automatically levelled up, and in some cases an additional automatic air blast ensures a more even depth of material as it passes over the riddle.

One new machine imported recently has a self-levelling device to keep the riddles level lengthwise, and a manually-controlled power drive raises or lowers the wheels so that the machine is kept vertical and the riddle box horizontal across its length when it is operating on hillsides.

The Screen

A header may be fitted with a replaceable set screen or wire screen adjustable for all crops. Here any remaining impurities such as broken seed, some weed seeds, and small particles of soil and dust are removed from the sample of seed, which may be divided into first and second grades.

Care of the Machine

Though a header harvester appears complicated, it is not if the operator understands his machine. He soon becomes adjusted to the regular rhythm of an efficiently operating header harvester, and any departure from this rhythm will jar on his senses so that he will stop the machine immediately and effect the necessary adjustments or repairs.

Lubrication

Before a header harvester is started, even for a trial run in the yard, it must be lubricated adequately by

Safety Precautions with a Header Harvester

WHEN operating under field conditions a header harvester requires to be lubricated at least three times a day—sometimes more—and while carrying out this work the operator must climb all over the machine to reach grease nipples. Because the soles of his boots are slippery as a result of working in the harvest field, he runs a grave risk of slipping and injuring himself as he climbs up and over the steel of the machine. This illustration shows two additions fitted to a standard machine as supplied by the manufacturer which greatly improve the safety of its operation.

A steel ladder, cheaply welded up from scrap angle iron and fitted at little effort and cost to the rear of the machine, enables the operator to climb quickly to the top of the machine to carry out adjustments, examinations, or lubrication—all with greater ease and at minimum risk of slipping.

Two white flags 18in. x 9in. clearly indicate the width of the machine when it is on the road. One of these flags, rolled up and folded back during field work, is indicated by an arrow in the illustration. The provision of these two flags complies with the Transport Department's regulation governing the haulage of over-width vehicles on the road during daylight, and some farmers and most contractors move their machines along roads during the season's work.

Important precautions with a header harvester are:—

If the machine is operated by power take-off, keep all shields in place.

Do not adjust, alter, or grease a machine in motion.

Do not operate a header harvester on a hillside the steepness of which endangers the stability of the machine.

—*C. J. CROSBIE, Farm Machinery Instructor, Department of Agriculture, Christchurch.*

following the makers' recommendations. With its multitude of drives, cross-shafts, and pulleys—some turning at up to 1600 r.p.m.—regular greasing of all bearings is essential, even though the fast-moving ones are running in high-grade roller and ball bearings. Oil levels in the gearboxes must be maintained and the oil changed regularly. During working days the machine must be greased as suggested by the manufacturers, and more often if conditions are extremely dusty, as when working in peas.

Care should be taken not to grease parts too much at one time, for excess lubricant rapidly works out of a bearing. The excess from an internal bearing contaminates the seed sample, and some of the grease from an exterior bearing will fly on to the rubber belts and perish them.

Grease should never be allowed to remain on rubber belts or tyres, as it perishes the rubber, and this action is speeded up in hot sunshine. An efficient grease gun of large capacity, preferably of the lever-action type with a clip-on nozzle, is a valuable asset to the farmer with a header harvester and speeds up greasing markedly.

Adjustments and Replacements

Apart from the check it receives each time it is lubricated, at intervals during the season the header harvester should be checked thoroughly for loose bolts and rivets and all deficiencies repaired.

If a breakage occurs, it is important to determine its cause before the part is replaced. If the breakage was the result of normal wear or a defect, the part may be replaced at once, but if misalignment of surrounding parts caused the breakage, it must be corrected before the part is replaced or the new part will soon break.

Carrying and Ordering Spare Parts

It is difficult to advise what spare parts should be carried by a farmer as insurance against long breakdowns, which may cause the loss of a crop because of wind or rain or both. At all times there should be carried on the header harvester a bag of bolts, nuts, and washers of assorted sizes, cotter pins, grub screws, grease nipples, rivets, and spare knife sections and ledger plates. In addition, it is wise to carry spare links suitable for the chains used in the drives and, especially if the machine has been in use for a season or two, spare V belts if they are of a size not readily obtainable on the local market. Where the machine is working on stony ground a spare set of drum bars is good insurance against delay should a big stone be picked up and passed through the drum.

When spares are being ordered from the local agent the serial number of the machine should be quoted first, followed by the number and full name of the part required. A few minutes spent in checking the number and correct name of the part in the repair parts book supplied with the machine may obviate hours of delay in replacing the part. Machinery firms realise fully the urgency of a call for spares during the harvest season and exploit all methods of transport to get the part to the farm in the shortest possible time. Co-operation by farmers assists them in their work and reduces delay to the minimum.

Storage

At the close of a season the header harvester should be put in a shed and cleaned thoroughly. All excess grease should be removed and dust and vegetation cleaned out, as they collect moisture during damp weather and set up rusting.

After it has been cleaned the machine should be greased and all V belts taken off and stored in a cool place. The tension should be taken off all canvases and drapers.

The machine should be overhauled thoroughly and all nuts and bolts checked for tightness. The use of spring washers is advocated. Repair work should be attended to during slack periods. If more attachments are required for the following season's work, they should be ordered and fitted before the rush of work at the beginning of the season.

The weight should be taken off spring parts and the machine jacked up and put on blocks to take the weight off the tyres.

If the header harvester is engine functioned, the petrol tank should be emptied, the crankcase drained and refilled after being washed out, and the radiator drained. A good practice is to remove the spark plugs, squirt light oil into the cylinder head so that it forms a layer on top of the pistons, then turn the engine over by hand several times to ensure that the cylinder walls are well lubricated. Sometimes stored engines are started and run for a short time once or several times during the storage period, but unfortunately the good accruing from the lubrication obtained in this way is offset by the harm caused by acids formed as a result of by-products of combustion in the form of exhaust gases combining with water vapour. Acids formed in this way corrode the cylinder walls and other parts, and therefore it is not recommended that engines be started during the storage period.

Electrical fittings should be checked and any frayed or worn leads repaired or replaced. Parts subject to deterioration by moisture should be protected during winter.

Parts with chipped paint should be repainted to protect them from corrosion and rusting.

In general, if a header harvester is cared for adequately during the off season and understood and used intelligently during its working season, it will perform satisfactory work, but like any other machine it is only as good as its operator makes it.

Conditioning of Bees to Control Pollination

HEADING PHOTOGRAPH: The apiary used in the New Zealand experiment, with red clover flowering in the foreground.

CONTROLLED pollination means inducing bees to visit flowers they would not find attractive normally, so increasing pollination of those blooms. This article describes methods of influencing bees developed overseas and details an experiment conducted in Canterbury to determine the worth of controlled pollination for red clover under New Zealand conditions. The authors are T. Palmer-Jones, Research Officer, Department of Agriculture Animal Research Station Wallaceville, and E. Smellie, formerly Apiary Instructor, Department of Agriculture, Christchurch, who express doubt whether the procedure has much future in the Dominion.

SOME twenty years ago von Frisch in Germany first suggested that bees might be guided to crops they would not visit ordinarily. At that time he had been investigating methods of communication used by bees, and present knowledge of the so-called language of the bees is mainly the result of his painstaking observations.

German and Russian Experiments

Von Frisch also found that if bees were fed with syrup on certain flowers (for instance, phlox), they would visit these flowers to seek nectar, even though they did not visit them ordinarily. In 1927 he suggested that this method might be used to guide bees in their foraging, but no one in Germany followed up the idea and it was left to the Russians to apply a variation of it.

The Russians recommended using an infusion made with equal weights of sugar and water. The sugar is dissolved in warm water, the pulled-out flowers added—in the case of red clover only the corollas and not the green calices—and the whole covered and let stand for 2 to 5 hours. There should be 113 to 170 red clover flowers to a pint of water, and 1¼lb. of sugar per hive. After the mixture has been fed to bees inside the hives they go out and seek for red clover nectar. A Russian worker, using this method, trained hives of bees to concentrate their flights on vetch, sunflower, and lucerne. Visitation of clover fields was increased by an average of 14 times over that of controls, and one investigator induced a 30-fold increase in visitation. There was a decided increase in the yield of seed from these fields in addition to an increase in the amount of honey stored. One worker claimed seed production was increased three times.

Von Frisch found the method as successful as feeding bees on the flowers, but much depends on the species of flower. He succeeded with a thistle, but not with extract of rape, which gave very little aroma to the water. Oil of thyme did not "train" bees to visit the flower; evidently it did not smell the same to them as the flower.

In Germany it was shown consistently in eight experiments that visitation of red clover was increased 10 times by conditioning the bees. Seed yields of red clover increased by from 39 to 124 per cent. in fields to which bees had been directed. The method seems of marked value in the case of red clover.

Visitation of weakly scented flowers can be increased by putting an artificial aromatic substance in a sugar solution in the hive and then spraying the flowers with the same aromatic substance. If the conditioning is done at night, only the conditioned bees seek outside flowers the following morning; if the feeding is done by day, all the workers are notified by the dancing sisters who received the food. A flower poor in nectar cannot be used for such conditioning, as competition from other sources of nectar is too great. Application of the method to German agriculture in 1942 showed that red clover seed production could be increased by from 22 to 52 per cent.

Three Methods of Conditioning Bees

It is apparent that bees can be directed or conditioned to a scent, and this reaction can be put to practical uses. The bees communicate the scent to the hive, with the result that subsequent visits of most bees are concentrated on blossoms carrying this aroma.

Three methods are available for carrying out the conditioning:—

Outdoor feeding on the flowers: If bees are fed with syrup on the flowers, less syrup is required than for feeding inside the hives, but robbing may occur. The method is used when honey yield is the main object, as it was in Germany during the war. Weakly scented blossoms give good results provided the bees are fed the conditioning mixture in the open.

Aromatic substances on flowers and inside hives: Visitation of weakly scented flowers can be increased by putting an artificial aromatic substance in a sugar solution in the hive and then spraying the flowers with the same substance.

Feeding of syrup inside hives: This method, which requires about ½lb. of syrup per hive nightly, is used for increasing pollination. The bees should be presented with fresh blossoms each day to ensure continuous flights to a specific blossom. Large-scale experiments in Germany showed that the method caused an increase in the beekeeper's surplus, in some cases considerable, with red clover, lucerne, buckwheat, onions, and some wild nectar plants. Bees were observed to work the plants more energetically, and an increase of seed yield was proved. In Russia seed yield was reported to increase.

Experiment in New Zealand

Throughout the world it is recognised that seed yields of red clover could be increased considerably by

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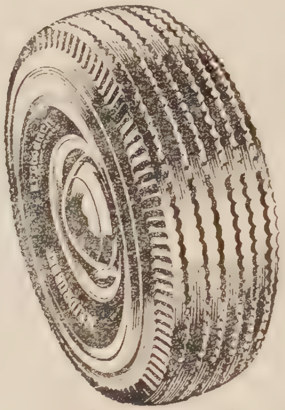

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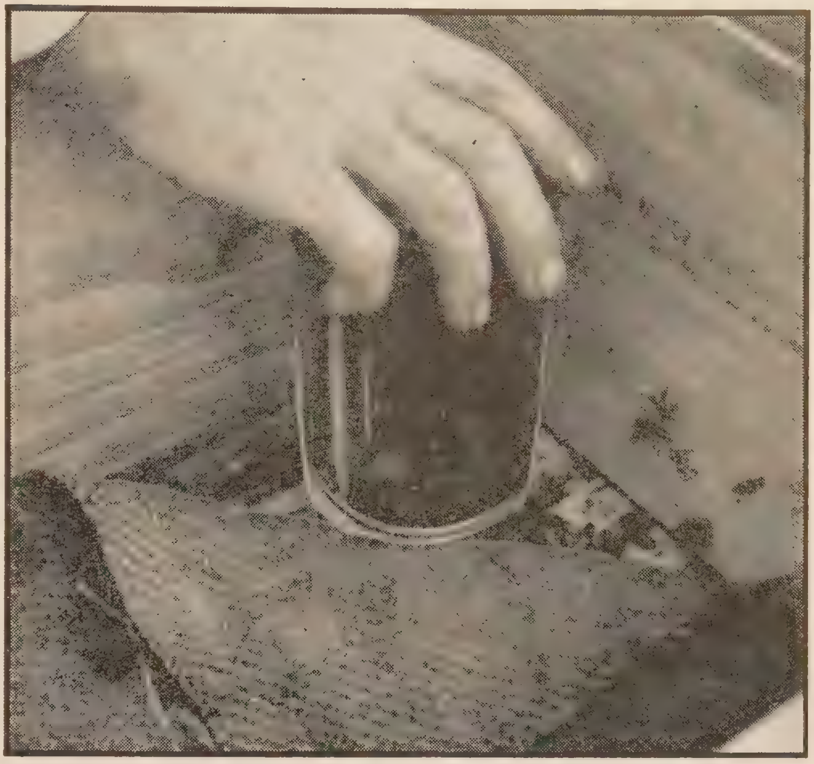
more effective pollination. Therefore an experiment was begun in Canterbury with the object of discovering if the use of controlled pollination was economic for red clover under New Zealand conditions.

Even under the most advantageous conditions colonies of bees do not obtain sufficient honey from red clover for their support. Fortunately, in Canterbury, where red clover is grown extensively, it flowers after the main honey flow, so that the use of bees for controlled pollination would not mean losing the usual honey crop from other sources. It may be thought that insects other than hive bees, particularly humble-bees, would suffice for pollination. However, both in New Zealand and overseas, coverage by other insects is insufficient. The large paddocks in Canterbury, with very little unworked ground, leave practically no undisturbed area available for the nests of humble-bees and other insects. Russia after the revolution suffered from the same problem, as the collectivisation of small farms resulted in a large-scale uprooting of hedges and a serious reduction in the population of insect pollinators.

A hive bee visits only 800 red clover flowers per hour on an average, compared with a humble-bee's 1500, but despite this hive bees are somewhat better pollinators than humble-bees, as they make greater efforts to enter the flowers and also work at a time of day when the pollen is in better condition. Contrary to belief, long-tongued bees do not predominate on red clover. Though the hive bee cannot put her head into the corolla tube to any extent, she is able to remove the nectar in many cases, despite the fact that the tube is a good deal longer than her tongue, because if the level of the nectar be high enough for the bee to reach it, she is able to empty the flower, capillarity aiding her to draw up all the nectar from the tube bottom, though her tongue cannot reach so far down. Long-tongued bees have some advantage, as they can reach the nectar when the supply is less plentiful, but short-tongued bees are equally able to collect red clover nectar when the flow is good.

CONTROLLED POLLINATION EXPERIMENT



Placing a feeder containing the infusion of red clover flowers in a hive.

Picking red clover flowers for infusion in the syrup.

Conduct of Experiment

Because of the abnormally dry season in 1948, difficulty was experienced in obtaining a satisfactory site for the experiment, but finally one was chosen in the Waddington district on the farm of Mr. F. A. Bull. The experiment was begun on February 19. About 60 per cent. of three-quarters of the field of Montgomery red clover was still in suitable bloom.

The 30 hives used in the experiment were divided into two groups of comparable strength—15 controls and 15 conditioned hives. To make the syrup 22½lb. of sugar was dissolved in 8 pints of water, heated to 160 degrees F., and 1500 freshly picked red clover flowers (2½lb.), tied in a cheesecloth bag, were mixed thoroughly with the solution. After some 4 hours' infusion the sugar syrup was used to fill 2-pint mason-jar feeders, which were placed in the group of hives being conditioned.

COUNTS OF BEES ON RED CLOVER FROM DIRECTED AND CONTROL HIVES

Date and time of count	Total for 3 lines	Maximum and minimum temperatures for 24 hours ended 10 a.m. (degrees F.)	Weather	Hives closed or open	Remarks
February 20		82 and 64	Warm N.W. wind	Both open	
February 21		80.25 and 65	Fairly warm morning; cold and overcast in afternoon	Both open	
February 22		69.5 and 36.5	Rain during night; day warm and sunny	Both open	
February 23, 3 p.m.	383	73 and 58	Morning cloudy and cool	Both open	Bees active throughout day
February 24, 2.10 p.m.	21	75 and 45	Rain during night; morning sunny	Controls closed	Clouded and cool when count made
February 25, 1.15 p.m		68 and 35	Heavy rain during night; cool day	Directed hives closed	Temperature too low for bees to fly
February 26		61 and 42.5	Intermittent sunshine; cool day	Controls closed	Temperature too low for bees to fly
February 27		59 and 40	Easterly wind	Directed hives closed	Temperature too low for bees to fly
February 28:					
10 a.m.	84				
11.30 a.m.	198	67.5 and 37.5	Hot and sunny	Controls closed	Bees active throughout day
1.30 p.m.	94				
February 29					
10 a.m.	76				
11.40 a.m.	61	76 and 44	Hot and sunny; N.W. wind	Directed hives closed	Bees slightly more active than on previous day
1.30 p.m.	52				

The following day sugar syrup was made up as before and the solution halved. The red clover flowers from the previous day, which had been kept in a closed tin of syrup, were infused in one half for 4 hours and 1¼lb. of freshly picked flowers were infused in the other half. The infusions were pooled and fed in feeders as before.

The next day the same procedure was followed except that 2½lb. of freshly picked flowers, plus the 1¼lb. from the previous day, were used for the infusions. This procedure was continued on successive days.

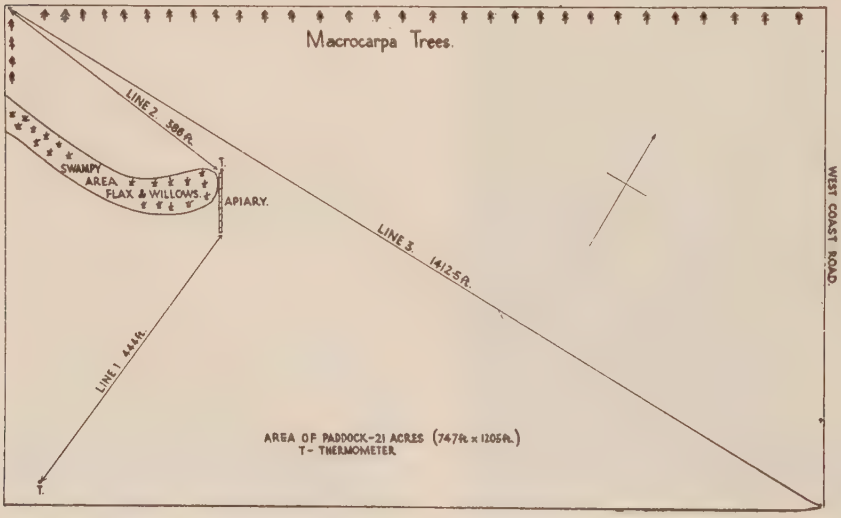
Checking Efficiency of Conditioning

Much larger quantities of red clover honey collected by the conditioned hives than by the controls would indicate that conditioning was effective. However, red clover usually produces so little honey that the method would not be reliable. In the Canterbury trial no difference between the two groups was noticeable.

It might be thought that analysis of pollen brought in would be useful. Pollen samples were taken from all hives, but no greater proponderance of red clover grains was detected in the conditioned hives than in the controls. In any case, the bees were conditioned to collect nectar, not pollen.

Another method would have been to mark the bees in one group with stains and make counts of marked and unmarked bees on the red clover flowers; that was not practicable. Two races of bees of different colours, black bees and Italian bees, could have been used, but different races probably would vary somewhat in foraging activity.

Finally it was decided to close with gauze screens the control and directed groups alternately during the day so that all bees counted on the flowers could be assumed to come from the open group. Particular care was taken first to ensure that all neighbouring hives were removed from within bee range of the experimental area. In making the counts the two operators walked slowly side by side through the clover paddock, each counting all bees seen on his side. The same three lines were followed for all counts made. These lines were arranged to cover representative portions of the field.



Conclusions Drawn

The experiment was not prolonged after February 29, as by this time only about 2 per cent. of the clover flowers were unseeded. Satisfactory counts for the four days preceding February 28 could not be made because of cold weather. When conditions for bee flight were at their best on February 28 and 29 the number of bees from the directed hives working the bloom was three times that from the undirected hives. The first and last counts on both days for the two groups did not show such a striking difference. Conditions generally were better for bee flight on February 29, thus favouring the controls. The high count obtained on February 23 was no doubt the result of the fact that both groups of hives were unclosed and the percentage of unseeded clover flowers was much higher than it was a few days later.

Though the experiment was hampered by unseasonable weather and difficulty in obtaining a satisfactory site before the clover had begun to seed, it appeared that a great many bees were directed to red clover flowers by the treatment.

However, so much skill and labour is necessary for the successful operation of the method that it is doubtful if its practical application has much future in New Zealand.

Proof that the method has economic value would depend on first showing that it caused a marked increase in red clover seed production. The value of the increased seed yield could then be equated against labour and other costs involved in applying the method, but few, if any, farmers would undertake the work involved in the treatment of honey bees required for the task.

Acknowledgment

The authors acknowledge the assistance of officers of the Botany Division, Department of Scientific and Industrial Research.

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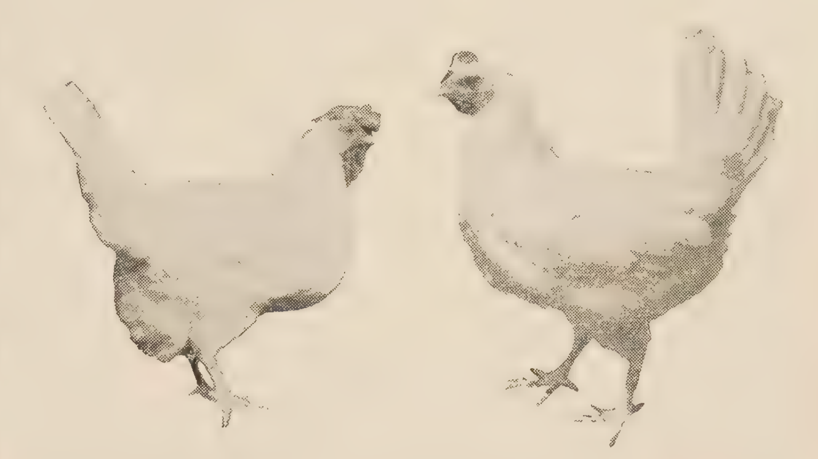
Household Poultry: Progress of Pullets—Preparing the Laying House—Type of Hen to Retain

EARLY-HATCHED pullets are now approaching maturity and plans must be completed for accommodating them in their permanent laying quarters. That work is discussed in this month's article for the household poultry keeper by W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, who also gives advice on the type of hen which should be allowed to survive culling.



Left—A sturdy layer, with length of back and depth of front and abdomen. Right—Long, narrow head, sunken eye, undeveloped comb, shallow body, and loose feathering betray this bird as a poor layer which should not be kept for another year.

THIS is an awkward time of the year for most household poultry keepers because of shortage of shed space. Few can afford to have a spare house for the growing pullets and allow it to remain empty for the balance of the year after they have been transferred to their laying accommodation. Most householders rearing pullets from a day old or 6 to 8 weeks old have to use temporary, makeshift arrangements for the young stock.

Once chickens are "off the heat" their chief housing requirements are space, dryness, comfort, and ventilation without draughts.

Progress of Pullets

Accommodation for the later-hatched pullets that will not begin laying for 2 months or so needs to be clean, free from mites, spacious, and airy. Its importance is as a shelter at night or during bad weather; a rainproof roof and perches higher than the eaves are the main features. Protection from winds, the heat of the day, and light rains is better supplied by shrubs and hedges. These pullets should be left in their rearing quarters as long as possible, but culling of the backward ones should not be neglected.

Pullets hatched in August will be approaching the lay, a condition which can be recognised by the growth and appearance of the comb and wattles and a softening of the pelvic bones. These pullets should be transferred promptly to their permanent quarters before they begin laying. At this stage they must be treated quietly and have no sudden change in the diet. They should be allowed to become accustomed to their new housing before they come into lay, and nest boxes should be left open so that they are encouraged to inspect and use them. Adequate litter is necessary on the floor and in the nests.

When pullets have been transferred to new quarters it is essential to inspect them at perching time for the first few nights, as sometimes they refuse to perch and must be re-educated. Huddling must be prevented.

When pullets have been reared in open spaces and are accustomed to perching on tree branches at night, a watch should be kept for colds developing soon after they have been transferred to the laying house. A few drops of kerosene poured gently into the water container so as to form a film on top through which the birds have to dip their nostrils is a wise precaution, and better still is 1 teaspoonful of Lugol's iodine in each gallon of water.

Preparing the Laying House

The laying house is now occupied by the hens, all of which should be in full lay if they have been culled correctly and regularly. Backyard poultry keepers tend to leave them undisturbed and allow the pullets to continue in their makeshift shelter. Nearly matured pullets are more important than old birds, as they are the ones which will give the winter eggs and profits. As soon as the pullets develop red combs the best hens for supplying current household egg requirements should be sent to temporary quarters and the pullets put into the laying house after it has been cleaned out thoroughly. Then the hens should be quitted as soon as each stops laying.

Cleaning of the laying house should include removing the floor litter, the fine, broken-down portion being bagged up to be put back again; dismantling all nests, perches, and equipment for cleaning and scrubbing, and placing them in the sunshine to dry (sunshine is the best germicide); thoroughly scraping and brushing concrete and earth floors and the lower walls; creosoting walls, perches, and nests; and carrying out all necessary repairs.

Disinfectants should be used for their known powers of disinfection and not because of their pleasant smell. A 2 per cent. solution of caustic soda is excellent as a disinfectant, a cleansing agent, and a germ killer; the water should be nearly boiling and the solution allowed to soak well into the floor and equipment.

Type of Hen to Retain

Many household poultry keepers persist in retaining aged hens. Sympathy for old pets that have done their duty nobly in their early years may be one reason, and perhaps a tendency to postpone culling until there is "time to spare" is another factor, but in most cases the chief reason for uneconomic, broken-down hens being kept is that their owner has never troubled to learn the distinctions between good and poor producers.

Even a novice at poultry keeping can recognise at a glance the outstandingly good or the very poor layer, but householders should not belittle their perspicacity to the extent of convincing themselves that they cannot distinguish between the intermediate grades. Experience of years will increase efficiency, and a start must be made some time. A few mistakes made now are better than failing to do any culling.

The last fortnight of February is one of the best periods of the year during which to grade both pullets and hens reaching the end of their laying year. It is advisable to know the approximate age of each bird, and an extra leg band should be put on each fowl at the beginning of every year. The older the bird the higher should be the standard up to which she must measure.

The first principle used in assessing a hen's future merits is that a thing which is good is likely to continue good. If the bird shows all the signs of having been an excellent layer, the chances are favourable that, after coming through the moult, she will again be a good producer next season. The February cull is only a preliminary one, even if it is the major cull of the year. The birds retained should be looked over again a month later and some more rejected.

MANAGEMENT OF HOUSEHOLD POULTRY . . .

The second principle is that of the "law of averages." A small proportion of a pen of layers are likely to cease production in January and some more in February, but most of them will lay until March. These non-producers should be rejected and about half of the original number of pullets housed may be retained.

The third principle is to judge by bodily appearance and conformation to what is called "type." This is far from being infallible, but in general "type" does indicate laying ability. The bird to select is one with good carriage, bold appearance, alert eye, and rugged head, wide and long in the back and deep in the chest and abdomen. Friendliness, inquisitiveness, and even greediness are favourable signs, as are neatness and tightness of feathering.

The advice given should not be construed as recommending that householders keep hens in preference to pullets, but rather that only hens which measure up to a high standard should be retained.

Other Work during February

Culling is the chief work with household poultry during February, but general cleanliness, the greenfeed rotation for the balance of the year, the comfort and progress of the growing pullets, and seasonal treatment for internal and external parasites must not be overlooked.

If replacement stock is still required, it should be obtained now, as further delay will reduce the chances of being able to obtain quality strains. At this time of year mainly cull birds are being offered for sale.

PEDIGREE SOW RECORDS

DURING the 11 months January—November, 1949, 32 of the 39 litters recorded were sufficiently good to be included in one of the five grades set out below:—

Grade	Minimum Litter Weight	
	At 3 weeks	At 8 weeks
1	120lb.	360lb.
2	100 ,,	300 ,,
3	90 ,,	270 ,,
4	80 ,,	240 ,,
5	70 ,,	210 ,,

Contributed by the Livestock Division.

Breed Averages for the Period

Breed	No. of Litters Recorded	Litter Weight at		Number of pigs		Average Weight at	
		3 weeks	8 weeks	Born	Weaned	3 weeks	8 weeks
		(lb.)	(lb.)			(lb.)	(lb.)
Berkshire ..	11	97.5	272.9	10.4	7.5	12.92	36.17
Tamworth ..	3	95.7	344.0	9.3	7.3	13.05	46.91
Large White ..	24	121.9	366.2	12.1	9.5	12.78	38.38
Large Black ..	1	99.0	267.0	8.0	6.0	16.50	44.50

A No. 3 grade is regarded as good, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:—

Owner's Name and Address	Herd Book Number of—		Litter Weight at		No. of Pigs		Grade of Litter
	Sire	Sow	3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	
Berkshire							
Ayson, W. R., Aparima, R.D. Otautau, Southland ..	22907	22147	78	242	15	7	5
Ayson, W. R., Aparima, R.D. Otautau, Southland ..	22907	24067	72	177	10	6	—
Ayson, W. R., Aparima, R.D. Otautau, Southland ..	22907	22147	65	196	11	5	—
Ellerm, O. C., R.D. Palmerston North	22742	21789	118	330	8	7	2
Ellerm, O. C., R.D. Palmerston North	22745	22741	102	243	9	7	4
Fredrickson, G. D., Te Whiti, R.D. Longbush, Masterton	23362	23889	85	292	9	7	4
Fredrickson, G. D., Te Whiti, R.D. Longbush, Masterton	23362	23889	109	315	11	8	2
Horsham Downs Pig Club (secretary, C. G. Haultain, Horsham Downs, Hamilton)	21532	22485	80	210	10	8	5
Horsham Downs Pig Club (secretary, C. G. Haultain, Horsham Downs, Hamilton)	21534	22485	99	236	8	7	5
Rowlands, T. E., Ruthin, R.D. Kaiapoi	24301	22646	107	348	12	10	2
Whitelock, G. M., Kairanga, R.D. Palmerston North ..	19492	22999	157	413	11	11	1
Tamworth							
Fredrickson, G. D., Te Whiti, R.D. Longbush, Masterton	16060	16048	127	433	11	8	1
Fredrickson, G. D., Te Whiti, R.D. Longbush, Masterton	16060	16048	97	317	9	8	3
Pohangina Pig Club (secretary, T. J. Spelman, R.D. Ashhurst)	14049	15673	63	282	8	6	—
Large White							
Bay, R., P.B. Collingwood, Nelson	7884	7989	114	362	13	13	2
Bay, R., P.B. Collingwood, Nelson	7884	7990	60	228	5	5	—
Betts, E. D., Kaipaki, Ohaupo	7866	7588	105	322	11	9	2
Davies, T. L., Ngahinepouri, R.D. Ohaupo	8520	7788	129	366	12	11	1
Davies, T. L., Ngahinepouri, R.D. Ohaupo	7310	7591	140	388	13	11	1
Davies, T. L., Ngahinepouri, R.D. Ohaupo	8520	7591	151	389	13	10	1
Glass, G. G., Whangamarino, Waikato	6215	7845	60	338	11	8	—
Harper, L. M. and R. J., Waiterimu, R.D. Ohinewai ..	7836	7305	136	396	16	10	1
Haydon, G. C., "Silverst," P.B. Greymouth	7675	6982	131	475	16	10	1
Hickey, G. W. and Sons, Kariotahi, Waiuku	7161	7599	58	160	13	8	
Hickey, G. W. and Sons, Kariotahi, Waiuku	7161	6490	90	258	15	8	4
Hickey, G. W. and Sons, Kariotahi, Waiuku	7762	6938	66	139	19	7	—
Horsham Downs Pig Club	7762	8422	81	247	8	7	4
McLean, C. J., P.B. Greymouth	6129	6984	121	282	11	9	3
Mundy, R. S., R.D. Whakatane	7340	7485	126	437	13	9	1
New Plymouth High School Board, Box 187, New Plymouth	7567	7287	178	475	12	12	1
New Plymouth High School Board, Box 187, New Plymouth	7567	7925	133	396	11	10	1
New Plymouth High School Board, Box 187, New Plymouth	7567	7909	150	458	11	11	1
New Plymouth High School Board, Box 187, New Plymouth	7261	7916	136	386	10	10	1
Pitman, J. H., Rotomanu, Westland	7706	7857	102	347	10	9	2
Pitman, J. H., Rotomanu, Westland	7706	7858	137	451	11	11	1
Quinn J. E., Kerepehi, R.D. Paeroa	8036	6919	212	675	18	14	1
Robinson R., Nukuhou North, R.D. Waimana	7786	7185	209	537	11	10	1
Vickers, H. E., Box 554, Hamilton	7977	6911	101	276	7	7	3
Large Black							
Missen, F. B., McLean's Road, R.D. Whakatane ..	5020	5025	99	267	8	6	4

The Making of Pre-cast Concrete Products

PREVIOUS articles in this series by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, which appeared in the November and December issues of the "Journal" dealt with the properties and methods of working concrete and the construction of reinforcing and forms. In this article the making of pre-cast products such as blocks, posts, pipes, and other concrete articles useful on the farm is described. The next article will deal with the use of concrete for foundations, yards and paths, and retaining walls and dams.

AS concrete hardens best in a warm, damp atmosphere, protection from heat and drying winds is as vital as protection against frost. With the normal concreting process this protection can be given by leaving the shuttering in position, but in the production of moulded articles the moulds must be released as quickly as possible to attain a reasonable output. For this reason adequate shelter is one of the first requisites for the manufacture of moulded articles; a shed provides facilities for continuity of production in wet weather and also for the correct curing of the finished product, thereby ensuring a superior article. This applies to all pre-cast concrete articles used on a farm, and if any of this work is contemplated, a reasonably good shed of sufficient floor area should be provided.

Just as on most farms it is economical to provide special sheds for particular work with stock, such as the milking shed and shearing shed, it may also be economical to provide a special shed properly equipped for the manufacture of concrete products.

The next requisite is a small concrete mixer either hand or power driven and bins for the storage of aggregate and sand. These should be provided at one end of the shed and, if quantities warrant, the shed and facilities can be retained for concrete product manufacture only and line production methods applied with great saving of time and labour.

Facilities can be provided for the production of concrete blocks, posts, pipes, water troughs, channels, and any other items on the chain system where the raw materials enter one end of the shed and are passed through in a continuous process ready for uplift at the other end as finished articles.

This equipment will consist of moulds, suitable benches or trestles, a vibrating table, a suitably equipped reinforcing bench, and a curing bay. Roller conveyers can save much lifting and carrying and so eliminate labour.

The equipment is arranged differently for each product. If blocks are to be manufactured, the necessary moulds or machine and benches are arranged to the best advantage; if posts are to be manufactured, different moulds and benches arranged in a different way will be necessary. However, the total amount of equipment required to manufacture most products is not excessive, as different combinations of the same equipment, with a change of one or two items only, are usually all that is necessary.

Suggested details of layout of a concrete products shed are given in Fig. 1.

Though it is not possible to give details of manufacture of all pre-cast concrete products, those most generally used on the farm will be dealt with. The technique of manufacture depends on the particular product and the type of concrete used in the manufacture of that product, and if each type of concrete is worked as indicated in the section "Methods of Working Concrete" in the first article of this series, the technique is readily apparent.

HEADING PHOTOGRAPH: Inserting wire staple hole cores in wooden moulds for fence posts before pouring the concrete.

THE MAKING OF PRE-CAST CONCRETE BLOCKS

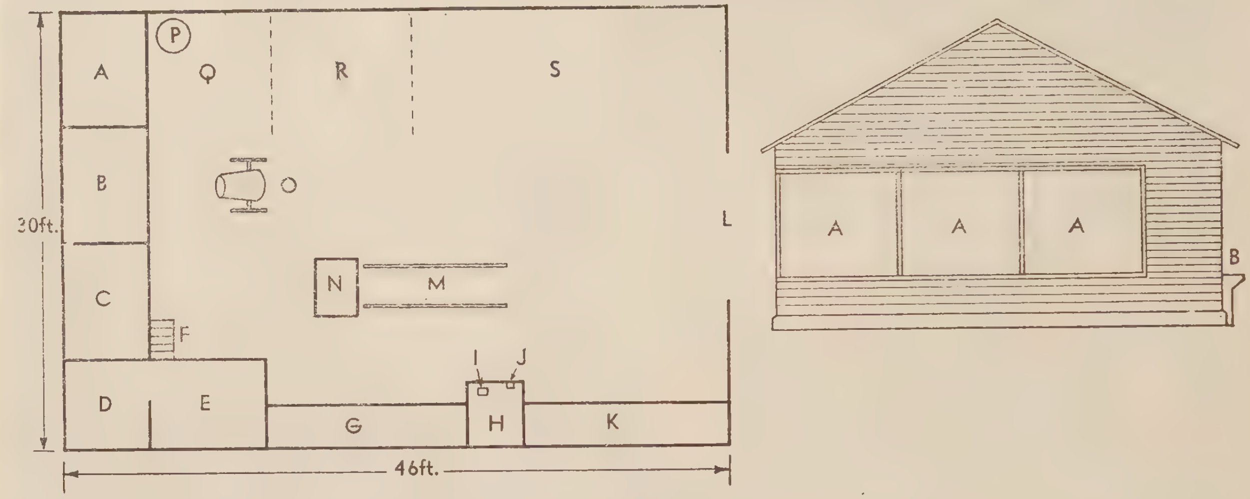


Fig. 1—The suggested layout for a concrete products shed. Left: Plan. A, B, C, and D—Material storage area. A—Bin 6ft. x 8ft. for large aggregate. B—Gravel bin 6ft. x 8ft. C—Sand bin 6ft. x 8ft. The fronts of these bins are only 1ft. high. D—Cement store 6ft. x 6ft. E—Unloading dock of truck height and 6ft. x 8ft. F—Steps. G—Rack and shelves for mould storage. H—Reinforcing bench. I—Bar bender. J—Vice. K—Steel rack. L—Door. M—Slide rails for post moulds. N—Vibrating table. O—Mixer. P—Water tub. Q—Mixing area. R—Moulding area. S—Hardening and curing area. Right: End elevation. A—Opening to bins to allow filling direct from truck. These openings are shuttered in wet weather. B—Unloading dock.

Concrete Blocks

Concrete products can be made to any size and shape, depending on the mould. The moulds used for the manufacture of concrete blocks will depend on the size and shape of the block required, which in turn will be influenced by the particular purpose for which the blocks are to be used. Load-bearing walls will require wider blocks than non-load-bearing partition walls to reduce the loading per unit area to allowable limits. Blocks can be cast with keys such as relatively placed tongue and groove so that one is keyed to another when laid, and they can be cast solid or hollow all according to the particular purposes for which they are to be used.

The British and New Zealand Standards Institutes issue specifications covering the manufacture of concrete blocks of all types and laying down the tolerances allowable in manufacture.

Pre-cast blocks for use in building can be purchased from a local manufacturer, several types of blocks being available, but if a ready supply of aggregate is available from, say, a stream or river deposit, it would probably be more economical for the farmer to manufacture them himself, moulds of wood or metal being either made or purchased. Proprietary metal moulds of two or three types are available. One good type, shown in Fig. 2, is designed to produce at one setting 9 keyed blocks 18in. x 4in. x 8in. high or 4 fencing posts 6ft. long by a simple change of set-up. By using a number of such moulds the production of concrete blocks could be carried out as a continuous operation, as by the time the last mould is filled the first one can be removed and prepared for refilling.

Collapsible timber moulds can be made quite cheaply and used effectively for dry-mix concrete blocks or, if sufficient moulds are provided for one day's operation, for wet-mix blocks. A timber mould suitable for 9in. x 9in. x 18in. concrete blocks either solid or hollow is shown in Fig. 3.

Mixtures for Blocks

As the binding material in blocks is cement, and blocks manufactured for building purposes may be required to possess other properties besides strength, such as good insulating or waterproofing qualities, the choice of aggregate is governed by its relative effect on those properties. Provided the strength factor is not decreased beyond allowable working limits, the aggregate chosen can be the best suited to particularly desired properties; for example, if insulating properties are desired, the aggregate should consist of porous material such as pumice or coke containing entrained air. If low moisture absorption is required, such as for blocks for water trough construction, well-proportioned crushed-stone aggregate and sand and added cement are necessary.

Cellular pumice and coke blocks are known as "breeze," and pumice aggregate blocks have the added advantage that if the pumice and other aggregate are proportioned correctly, nails can be driven into the blocks without being bent and yet be given a good hold. This is an advantage where timber is to be attached directly to the blocks.

Owing to their low compressive strength breeze blocks should not be used for the construction of load-bearing walls such as continuous foundations below plate level. In blocks for this purpose properties of insulation or waterproofing are not required and the blocks can therefore be manufactured with a view to properties of strength.

Blocks must be manufactured to suit the purpose for which they are intended and not for universal application to building. With two types of block, say, breeze and load bearing, it is possible to construct a wide range of buildings for different purposes by using the load-bearing blocks for foundations and columns and filling the spaces between columns with breeze blocks. This method of construction will be dealt with in a later article in this series. Any blocks made for building purposes must be manufactured in accordance with the specifications of the local building authorities and be approved by them.

The British Standards Institute specifies that aggregate for concrete blocks shall pass through a ½in.-mesh sieve, and for non-load-bearing blocks may consist of natural gravels, whole or crushed stone, natural pumice, foamed slag or granulated blast-furnace slag, well-burnt furnace clinker or light-weight aggregates prepared by heat treatment of suitable slates and clays.

For load-bearing blocks aggregates may be natural gravels, crushed stone, crushed, air-cooled blast-furnace slag, or crushed burnt-clay bricks. All aggregate must be free from deleterious material, clay, mud, and fine volcanic or other dusts and for non-load-bearing blocks can be used with or without sand.

Method of Manufacture

The method of manufacturing blocks is as follows:—

The proportions of mix and types of aggregate are governed by the type of block required (insulating, water resistant, or load bearing) and local

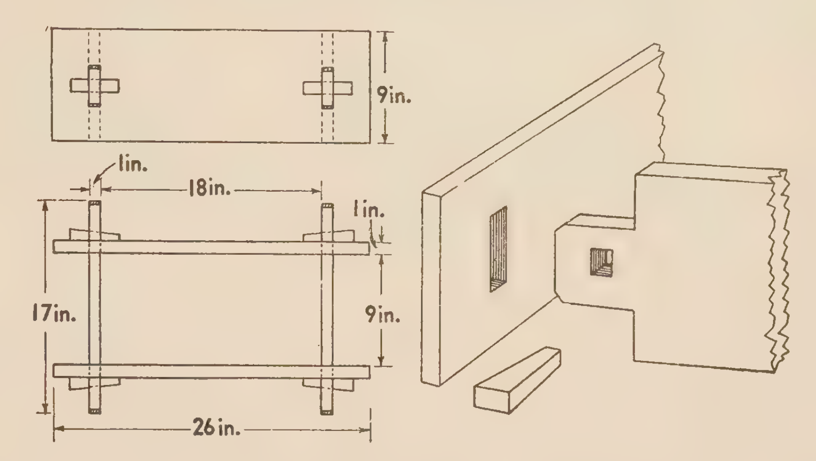


Fig. 3—A collapsible wooden mould for making solid or hollow concrete blocks 9in. x 9in. x 18in. Upper left: Elevation. Lower left: Plan. Right: Tenon and mortise joint and wedge by which the mould is assembled. When the mould is used for making hollow blocks a dummy the size of the cavity is inserted in the centre of the mould while the dry-mix concrete is being rammed and is removed immediately ramming is completed.

availability. Mixing is carried out as described in the first article in this series, just sufficient concrete being prepared at one time to fill the moulds available. If a wet mix and bottomless moulds are used, the moulds should be placed on a flat steel sheet before filling to facilitate transfer to the vibrating table. After vibrating the sheet is transferred to the curing room and after the initial set has taken place the moulds may be removed from the blocks and cleaned for further use. If a dry mix is used, the concrete must be well rammed in the moulds and the blocks cast either where they will cure or on flat trays which can be transferred to the curing room. With a dry mix the moulds can be removed from the blocks almost immediately.

A number of block-making machines which produce blocks of various sizes are available on the market. By eliminating moulds and handling, these machines greatly expedite block manufacture. All use a dry mix and high compression and blocks can be removed from the machine immediately after forming and will not crumble if carefully handled.

Curing of Blocks

Concrete block manufacture cannot be carried out satisfactorily in the open, as curing cannot be undertaken effectively. Blocks when cast and stripped from the moulds should be kept moist for at least 7 days and protected from any hot, drying atmosphere for at least 4 weeks. It must be remembered that the hardening action of cement is chemical, and as it occurs over a period of time, sufficient time must be allowed to permit this action to take place.

Special Blocks

Experiments have been carried out by local firms in the development of stabilised-soil blocks. The practice of stabilising soil, which is developed to a high degree in America, utilises cement or bitumastic compounds to stabilise inorganic soil to make it suitable for compressed block manufacture; that is, instead of using cement and aggregate in the ordinary way cement and soil are mixed together and formed into blocks under compression by a machine.

Very satisfactory blocks are produced by this method; the advantage is that a much smaller quantity of cement is required to produce a given volume of blocks and local soil is used, thereby obviating cartage of aggregate.

Strength of Blocks

Standard specifications for concrete blocks indicate that the compressive strength of load-bearing blocks should be not less than 1000lb. per square inch average gross area. For non-load-bearing blocks the compressive strength may vary from 225 to 500lb. per square inch, depending on the type of aggregate used and the proportion of cement to mixed aggregates.

In the manufacture of all ordinary concrete blocks the usual proportion of aggregate to cement is 6 to 1 or the No. 2 concrete specified for fence posts in the first article in this series. The proportion of coarse and fine aggregates may vary, as with breeze blocks the total coarse aggregate may not necessarily be pumice or coke, but may also include a percentage of gravel, particularly if strength as well as insulation is being considered for the same block.

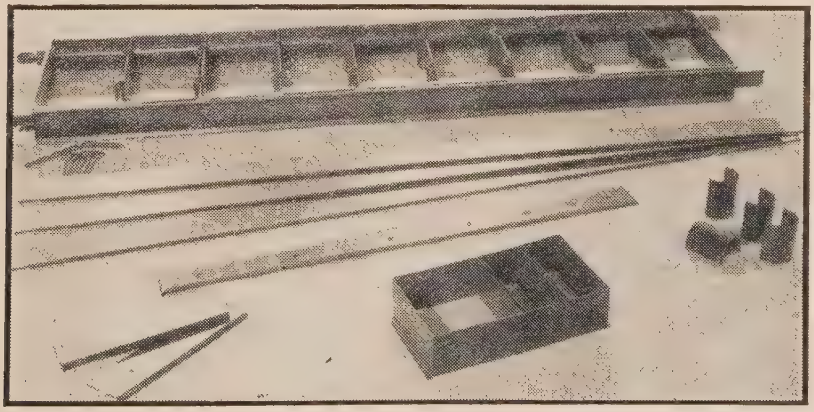


Fig. 2—Combination metal moulds for making concrete blocks and posts.

Ordinary good concrete made from normal gravel sand and cement in the proportions of 6 to 1 has an ultimate crushing strength of approximately 2000lb. per square inch. Maximum permissible compressive strength for the same concrete as laid down by the New Zealand Standard Building Code is given at 600lb. per square inch, which is generally accepted as being the normal permissible loading for building concrete. The compression on any part of a building structure is the weight per unit area of the superimposed structural load plus added live load, and to keep the total loading down to a safe figure per unit area the total area bearing a stated load must be increased accordingly. For this reason larger blocks must be used for foundations under floor plates than need be used for walls supporting their own weight and the weight of a roof only.

Tests taken on proprietary concrete-pumice breeze blocks gave a yield strength of 670lb. per square inch, which indicated that, though these blocks may be suitable for non-load-bearing wall construction, they would not be sufficiently strong to withstand normal building loads if used in load-bearing walls. Tests of stabilised-earth blocks gave an average yield strength of 500lb. per square inch.

From these figures it is apparent that load-bearing blocks must be specially manufactured of sufficient size to reduce the loading per unit area to allowable limits and of sufficient strength to take the loading per unit area with an ample factor of safety. Non-load-bearing blocks can be used for partition walls.

Concrete Posts

Unlike blocks, which are mostly compressively loaded and can be cast with either a wet or dry mix and do not require reinforcing, concrete posts must be cast with a wet mix and be

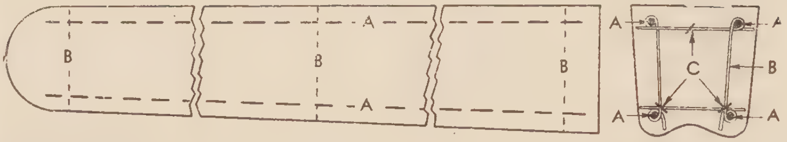


Fig. 4—Positioning of reinforcing in a concrete fence post. Left: Plan. Right: End view. A—$\frac{1}{4}$in. diameter mild steel rods $\frac{1}{2}$in. in from the sides. B—Wire jigs. C—Wire ties for jigs.

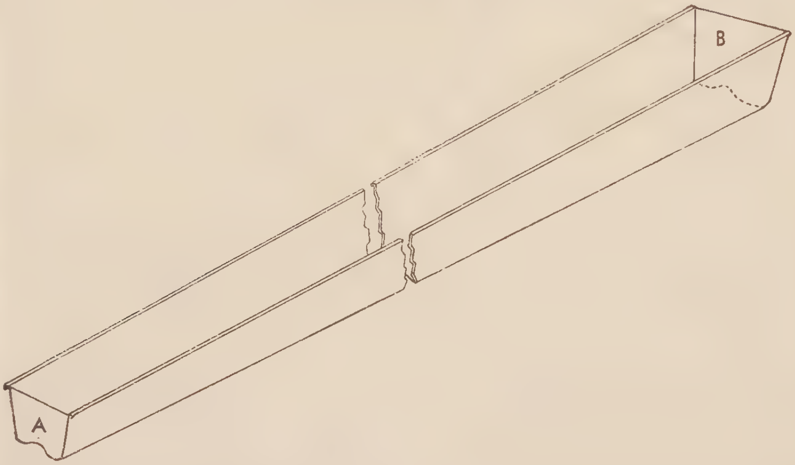


Fig. 5—A sheet-steel post mould, which is tapered from bottom to top and from front to back and has a rounded, formed bottom. A—Top of post. B—Bottom.

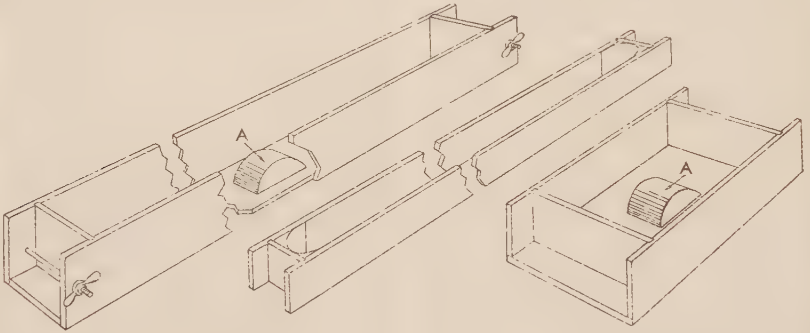


Fig. 6—Moulds for strainer posts. Left: Strainer post mould. A—Block to form slot for strut. Middle: Strut mould. The ends are rounded to fit the slot in the post and the slot in the foot. Right: Foot mould. A—Block to form slot for strut.

reinforced. The need for this is obvious when the stresses imposed on a post are considered.

Reinforcing placed in concrete with tensile stressing must be proportionate to the degree of stress and placed along the lines of stress to afford maximum advantage. A fence post has forces exerted sideways by the pull of the wires which are opposed by other forces represented by soil resistance differently disposed in relation to the post's length; that is, wires exert forces along about two-thirds of the post and these forces are resisted by counter forces spread over the remaining third, which is in the ground. The resultant of these forces is a bending moment in the post which the concrete is not strong enough to resist on its own and which must be countered with a high-tensile material such as steel.

A fence post may be considered as a laterally loaded column in which any external forces imposed will be neutralised by internal forces which are symmetrical about the centre line of the post in a plane at right angles to the direction of the forces. For this reason heavy reinforcing centrally placed is useless, reinforcing being required in the stressed areas near the edge. If it is assumed that external forces may be applied from any direction, the best place for reinforcing is parallel to and equidistant from the neutral axis at sufficient radius to give maximum strength while still retaining sufficient coverage. Rods of $\frac{1}{4}$in. diameter have sufficient strength to resist the resultant of any normal external forces imposed in ordinary fence posts and should be spaced as shown in Fig. 4.

Moulds for Posts

Moulds for concrete posts can be either wood or metal and with or without bottoms. If bottomless moulds are used, casting must be done on a flat surface and the moulds cannot be readily vibrated. The bottomless mould shown in Fig. 2 requires a flat surface, on which the posts are cast and allowed to cure. The advantage of this method of casting is that fewer moulds are required, the mould being removable almost as soon as casting is completed. However, as no consolidation by vibrating can be given, the quality of the article produced is probably poorer.

An inexpensive light sheet-metal mould is shown in Fig. 5. This mould enables posts to be cast and transferred to the vibrating table and the curing room with safety, the only requirement being sufficient moulds for one day's working, as this type of mould should not be removed under 12 hours.

Mixture for Posts

A suitable mix for fence posts is the No. 2 concrete specified in Tables 5, 6, and 7 in the first article in this series, to which is added gravel graded to $\frac{1}{2}$in. mesh. The proportions of aggregate to cement are about 6 to 1. A mixture of good, clean, crushed gravel and sand is preferable to rounded shingle.

Method of Manufacture

The method of manufacturing concrete posts is as follows:—

To ensure correct spacing and coverage the reinforcing rods cut 2in. shorter than the mould are assembled in light wire jigs as shown in Fig. 4 and placed in the mould. The mould is then carefully filled with a mix of about the consistency of thick porridge and lightly tapped or vibrated to produce consolidation, the surplus mix being screeded off with a straight-edge.

With the gang mould shown in Fig. 2 the template is placed over the posts while the concrete is still plastic and the staple holes pushed through with a pin.

With wooden moulds the staple hole pins are sometimes put through holes in the side of the mould and must be placed when the mould is half filled.

Corner and Strainer Posts

Corner posts and strainer posts are needed much less than intermediate posts and require special moulds because of their size. Corner posts should measure about 6in. x 6in. x 6ft. 6in. long and be reinforced with $\frac{3}{8}$in. steel rods placed $\frac{3}{4}$in. in from each corner. Strainer posts for straight fencelines may be 7in. x 7in. x 8ft. long and cast with $\frac{1}{2}$in. steel rods placed $\frac{3}{4}$in. in from each corner. Strainer posts requiring struts should be cast with a slot or slots in the required position by placing rounded blocks of wood in the mould as shown in Fig. 6. Struts can be cast measuring 3in. x 4in. x 7ft. long with four $\frac{1}{4}$in. rods $\frac{1}{2}$in. in from the corners. Feet for struts can be cast as shown. The ends of struts should be cast to fit the respective slots in post and foot.

Concrete posts should be allowed to cure in the same way as concrete blocks.

A proprietary steel post mould is available for casting footless and stayless strainer or gate posts in situ (see Fig. 7). The mould is in two pieces and is joined at the opposite corners and tapers from 8in. at the bottom to 6in. at the top, being clamped with four wing nuts on each side.

The method of construction is to dig a hole 1ft. deep and 1 ft. square. Then, with a post hole borer, holes 3ft. deep (or less, depending on the nature of the ground) are dug at an angle of 45 degrees along the stress line of the fence. For corner posts three such holes are dug. The holes are then filled with wet concrete and two lengths of ½in. steel inserted in each hole; the four rods are brought together and temporarily held with a guiding stirrup at 7in. centres while the 12in. x 12in. hole is filled with concrete, which will then hold the rods in position. The mould is set up and an additional small stirrup placed to hold the rods in position while the mould is being filled. This stirrup is removed before the mould is completely filled and the concrete is finished off to a point. The mould may be removed in 48 hours, leaving a 3cwt. post keyed in the ground.

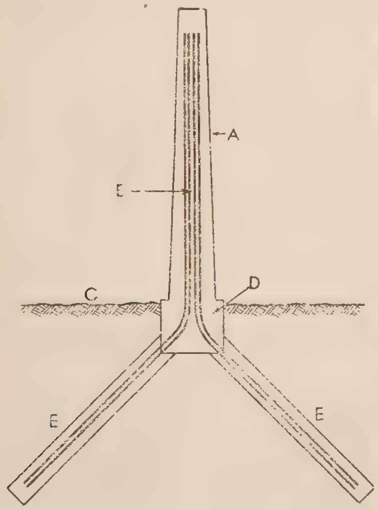


Fig. 7—Footless and stayless strainer or gate post. A—Steel strainer mould. B—Four ½in. steel rods. C—Ground level. D—Hole 1ft. deep and 1ft. square dug with spade. E—Hole 3ft. long made with post hole digger.

Stapling of Wire

Fastening of wire to concrete posts may be done in a number of ways, but perhaps the most popular is the method shown in Fig. 8. Also shown is a suggestion for a machine for bending and cutting wire staples quickly and easily.

Concrete Pipes

Concrete pipes can be used on the farm as field tiles for land drainage, as pipes for house drainage, or as culverts and storm-water drains. The size of pipe required is controlled by the quantity of fluid to be passed, and the shape of the pipe ends should be the most suitable for requirements. Field tiles which must permit water to pass through the joints should have square ends, but drain pipes which must be proof against the passage through the joints of either internal

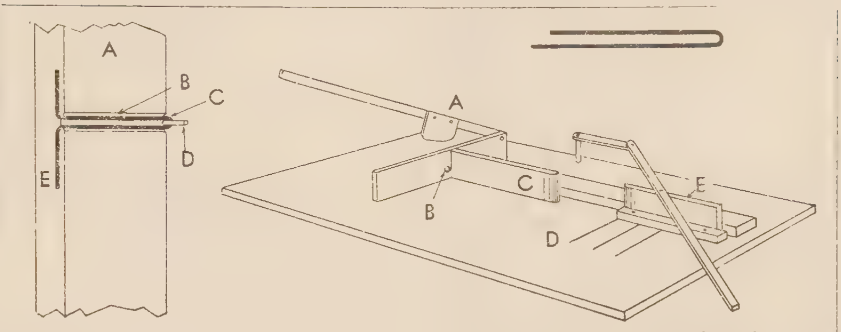


Fig. 8—Method of stapling wire to concrete posts. Left: Section through post, showing staple in place. A—Post. B—Staple hole. C—Staple. D—Fence wire. E—Back of the staple. The ends are turned over and fitted in the groove at the back of the post. Upper right: Staple of No. 8 fencing wire. Lower right: A suggested staple-making machine. A—Guillotine. B—Wire guide hole. C—Fixed former. D—Length gauge marks. E—Sliding former. The wire is inserted through the wire guide hole until it reaches the appropriate length gauge mark. The free end is then bent round the fixed former by hand and the sliding former moved down to complete the bending flush with the fixed former. The staple is then severed by the guillotine.

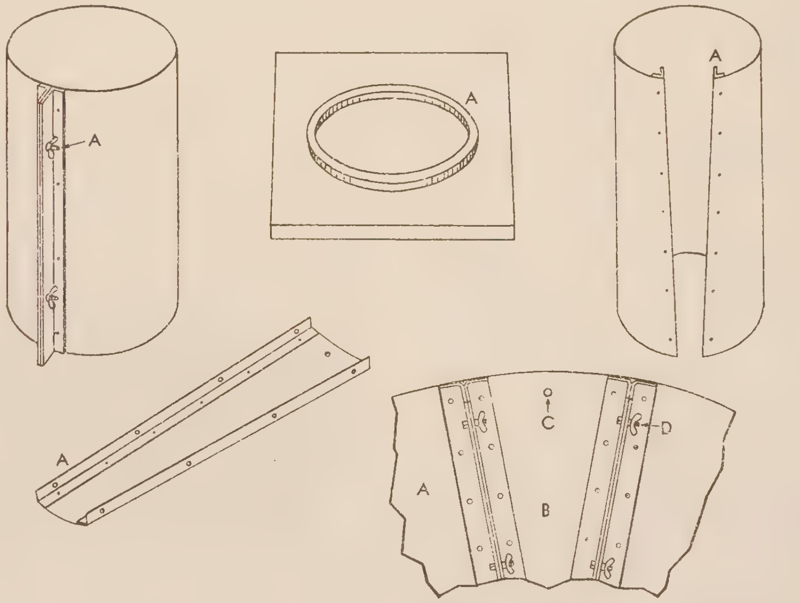


Fig. 9—Concrete pipe mould. Upper left: Sheet-metal outer mould, showing method of fastening. A—Bolt and wing nut. Upper centre: Base board. A—Wooden ring of same dimensions as pipe section. Upper right: Sheet-metal internal mould with wedge section removed. A—Light angle iron. Lower left: Wedge section, which fits on internal mould, showing arrangement of angle iron. A—Light angle iron. Lower right: A cut-away section of the internal mould, showing the method of fastening the wedge section. A—Mould. B—Wedge section. C—Pull hole. D—Bolt and wing nut.

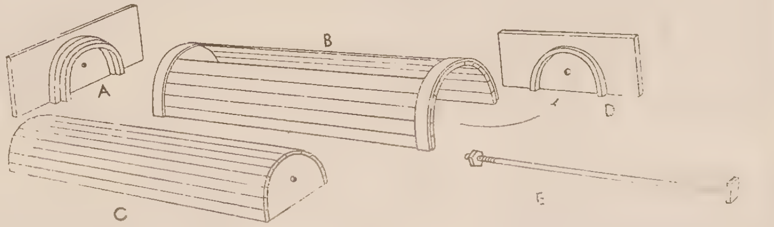


Fig. 10—Component parts of a gutter mould. A—Female spigot end. B—Outer mould, which is fitted on the ends with steel bands and has a gap along the top for filling. C—Inner mould. D—Male spigot end. E—Assembly bolt.

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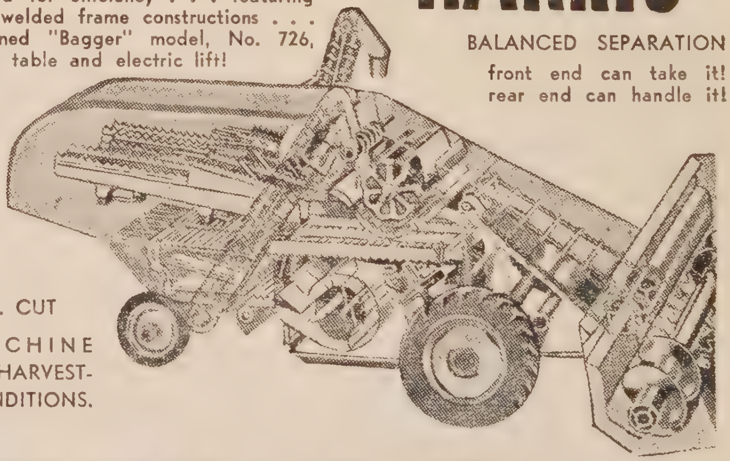

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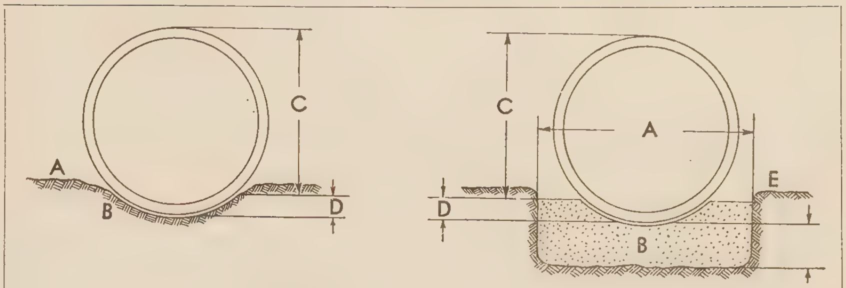

Fig. 12—Ordinary projection bedding of culvert pipes. Left: Pipe bedded in earth foundation shaped to fit. A—Ground level. B—Bedding. C—The height of the pipe above the bedding should not exceed 9/10 of the outside diameter of the pipe. D—The depth of the pipe in the bedding should not exceed 1/10 of the outside diameter of the pipe. Right: Pipe bedded in an earth cushion in rock foundation. A—The width of the earth cushion should be equal to the outside diameter of the pipe plus 4in. B—Earth cushion having a minimum depth of 8in. C—Height proportioned the same as a pipe in earth foundation. D—Depth proportioned the same as a pipe in earth foundation. E—Rock level.

or external water should have spigot and socket ends.

As the number of pipes required for house and storm-water drainage is usually small on most farms, it is generally not profitable to provide moulds for making such pipes, particularly as spigoted pipe moulds are complicated. Proprietary concrete pipes, being manufactured by a spinning process, are a much superior article to anything home made and are relatively cheap.

Concrete field tiles are commercially mass produced by machine and can be purchased at a price which does not justify the farmer's making his own by hand methods. The number required is usually large, and much time would have to be spent and a substantial outlay in moulds would be required for any appreciable output.

The manufacture of pipes that require reinforcing to resist any internally or externally applied loads presents problems. Such pipes are manufactured by special process under factory conditions which cannot be copied by home production except with special equipment.

The home-made pipes that probably show the most worthwile economy are those used for culverts, as the number required, though usually not sufficient to make purchase economical, does justify the provision of one or two moulds for production. These pipes are easily cast, as the joints do not have to be watertight and the ends can therefore be square.

Though it is necessary to suit the inside diameter of culvert pipes to the maximum volume of water passed, the larger sizes should be dimensioned with a view to the use of the pipe for other purposes. The length also, while being regulated by convenience of handling, should be considered from this aspect. For example, though a culvert pipe 2ft. in diameter and 3ft. long will handle a large volume of water and is sufficiently light to move about easily, it does not make as effective a stock watering trough as one 3ft. in diameter and 2ft. long, which, though probably less easy to lay as a culvert because of its larger diameter, will serve a dual purpose.

Fig. 9 shows the construction of a mould which can be suitably dimensioned to cast any size pipe, the principle of construction being the same in every case.

Mixture for Pipes

As culverts are subject to other stresses as well as compression, a good mix of No. 2 concrete (refer to the first article in this series) with crushed aggregate graded to ¾in. and clean sand will be satisfactory. The mixture should be mushy and must be well spaded round the mould. Lightly tapping the mould as it fills is a good practice, as it produces the same effect as vibrating.

Curing and Handling Pipes

The mould shown in Fig. 9 should not be removed for 5 days and when stripped the pipe will require careful handling and must be allowed to cure for at least 42 days before being used. After the mould is stripped the pipe should be removed from the base board and laid on its side for ease of handling by being gently tipped on to a sack stuffed with hay. After being removed from the mould pipes should be placed under cover and kept moist for 4 or 5 days.

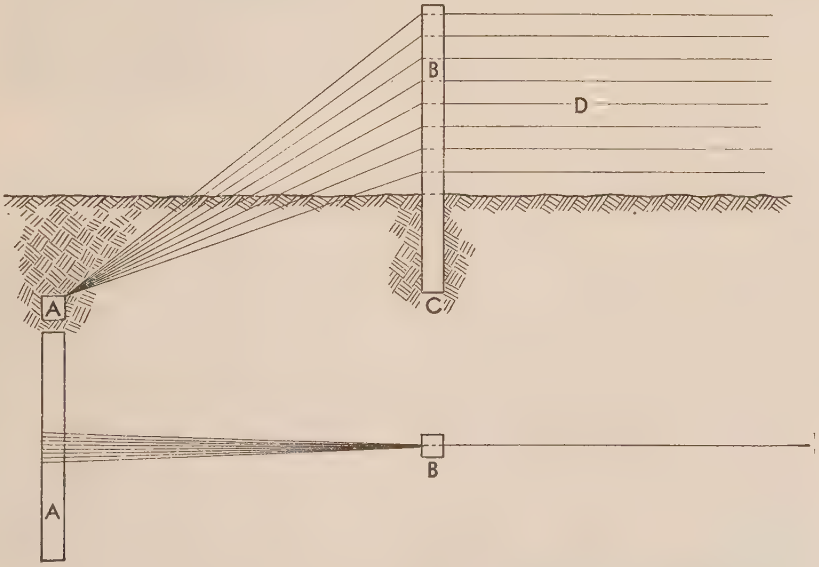

Fig. 11—A "deadman" post strainer. Upper: Elevation. A—"Deadman." B—Strainer post. C—Footing for post, which can be arranged to suit the country in which it is placed. D—Fence wires. Lower: Plan. A—"Deadman." B—Strainer post.

Pipes Used as Water Troughs

A pipe 3ft. in diameter by 2ft. long makes an excellent water trough by being placed on its end and floored with concrete. The turf and surface soil should be cleared from an area slightly larger than the outside diameter of the pipe, which must be sunk to a convenient height above ground level. The soil inside the pipe should be levelled and, where soft, rammed tight. Thoroughly wet the inside of the pipe for 6 to 8in. up from the bottom edge and paint it with a thick slurry of neat cement. Run in a 3 to 4in. thick floor of No. 1 concrete of mushy mix, spading it well to the pipe with a trowel. After initial set has taken place (in about 2 hours) run a 2in. fillet around the join of floor and pipe, using 2 parts of sieved sand to 1 of cement.

Gutters

Fig. 10 shows the principles of construction of a mould for casting gutters. The same principles can be applied to the construction of moulds for small water troughs. With a little ingenuity collapsible moulds can be constructed to cast almost any concrete article, and if casting is contemplated, much time and labour can be saved by planning and dimensioning a mould on paper before starting construction.

Use of "Deadman"

Where it is difficult to obtain ground hold for fence strainer posts, such as in swamps or rocky hill country, fences may be strained with a "deadman," and the strainer post should be cast with wire holes suitably placed.

Fig. 11 shows how this can be done. Sometimes it may be more convenient to cart the mould, aggregate, cement, and water to the site where a strainer post is required, as individually these items are lighter to transport than a cast post.

Bedding Culvert Pipes

Culvert pipes fully or partially buried are subject to stresses from earth pressure and loading. Loading may be static or live, that is, caused by materials stacked over the pipe or by impact from the passage of vehicles. These stresses are absorbed by the pipe and transmitted to the bed in which the pipe is set, and unless the bed is constructed to compensate for stressing, collapse or displacement of the pipes will result.

Where culvert pipes are only partially buried the proportion of the external vertical diameter above natural surface is known as the projection ratio; that is, where a pipe is wholly above natural surface the projection ratio is 1.00, but where it is half in a trench and half out the projection ratio is 0.50. As the settlement in an embankment is roughly proportional to the depth, the bank adjacent to the pipe settles more than the bank over the barrel of the pipe if the pipe projects above the natural surface. The cohesion in the bank increases the load because the earth settlement on each side of the pipe drags on the earth above.

The load on the pipe depends on the external diameter of the pipe, the projection and settlement ratios, the height of the embankment, the characteristics of its material, and the method of forming. The supporting strength of the pipe is influenced primarily by the method by which the pipe is embedded and to a less degree by the projection and settlement ratios.

The New Zealand Standards Institute has specified that pipes under embankments should preferably be laid with a projection ratio not greater than 0.85. A trench even of shallow depth should be excavated to decrease the projection and the pipes should be bedded as shown in Fig. 12.

In this method, known as "ordinary projection bedding," the pipe is bedded with ordinary care in an earth foundation shaped to fit the lower part of the outside circumference with reasonable closeness for at least 10 per cent. of the overall height, and the remainder of the pipe is surrounded by granular materials placed by shovel to fill completely all spaces under and adjacent to the pipe.

In rock foundations the pipe is bedded in an earth cushion of similar shape having a minimum depth under the pipe of 8in. Bedding should never be done so that little or no care is exercised to shape the foundation surface to fit the lower part of the pipe exterior or to fill all spaces under and around the pipe with granular materials. This applies also to rock foundation with an earth cushion so shallow that as the pipe settles under the influence of the vertical load it approaches contact with the rock.

A more permanent and satisfactory method is to bed the pipe in a concrete cradle foundation with haunched sides up to the horizontal centre line of the pipe.

Retirement of Director of Livestock Division

MR. W. C. Barry, Director of the Livestock Division, Department of Agriculture, Wellington, retired from the position of Director at December 31, 1949, after a term of service with the Division of almost 35 years.

MR. BARRY joined the veterinary service of the Department in 1915 and was stationed at Christchurch. After service overseas in the First World War he returned to the Christchurch office in May, 1919. In 1921 Mr. Barry was transferred to the Auckland office of the Department, where he was appointed District Superintendent of the Livestock Division in April, 1925. In this capacity he was transferred to Wellington in February, 1926, and was appointed Director of the Livestock Division in December, 1933, a position he has occupied for 16 years.

Besides administering the work of the Division, Mr. Barry was appointed chairman and registrar of the Stock-remedies Registration Board in 1936; in the same year he was appointed chairman of the Veterinary Surgeons Board. In 1943 Mr. Barry was appointed chairman of the Veterinary Services Committee set up by the Minister of Agriculture to inquire into the best means of providing an efficient veterinary service, including the training of veterinarians. As a result of the findings of the committee the Veterinary Services Act of 1946 was placed on the Statute Book. The principle result of the Act was the establishment of the Veterinary Services Council, on which Mr. Barry has been a Government nominee since its inception, and the extension of the veterinary club movement.

In his early administration of the Livestock Division Mr. Barry took an active part in the provision of an adequate staff to cope with the work of meat inspection, so that New Zealand's exports of meat and meat products would be acceptable in all overseas countries. The standard of inspection required for export is high.

The revision of the Slaughtering and Inspection Act and its replacement by the Meat Act, 1939, and the Regulations under this Act, stand as a monument to Mr. Barry.

During the Second World War many added responsibilities had to be met by Mr. Barry's Division, among them being the possibility of the introduction from overseas, either maliciously or by accident, of animal disease new to the Dominion, and every precaution was taken to see that this did not happen.

Recently the embargo on the introduction of stock direct from Great Britain was removed (a recommendation by the Director for many years), suitable precautions being taken as a safeguard. This measure has proved of considerable benefit to all stud breeders in the building up of flocks and herds in the post-war period.

A strong advocate of elimination of tuberculosis from the dairy herds of the Dominion, Mr. Barry was responsible for an amendment to the Stock Act being passed in 1945 which made compulsory the tuberculin testing of herds supplying milk for town supply and which provided for further extension of tuberculin testing of cattle generally. Owing to certain opposition raised on the question of compensation by town-milk supply producers, the measure has not yet become fully operative, but it is expected that adjustment of this difficulty will shortly bring about realisation of Mr. Barry's efforts.

[*S. P. Andrew Ltd. photo.*

Mr. W. C. Barry

A lover of thoroughbred horses, Mr. Barry was always willing to help in the fostering of the thoroughbred horse industry in the Dominion.

Mr. Barry has left the Department after a long period of service, carrying with him the good wishes of fellow-officers.

DISEASES AND PARASITES AFFECTING PIGS

THOUGH as yet there is no record of losses of pigs on farms, it is known that they are high. This article, which deals with post-weaning troubles, is the concluding portion of a discussion of pig losses on the farm, the first part of which appeared in last month's "Journal." It also concludes a series of three articles by the Livestock Division on losses in pigs. The first of the series, which dealt with losses of pigs through condemnation at the works, appeared in the October issue.

IT must be appreciated that weaning constitutes a check to the progress of the pigs, and anything which can be done to minimise this check should be done. The two most important steps in this direction are creep feeding from the earliest age piglets will take extra feed, and, at weaning, removing the sow and leaving the litter in the pen to which they have become accustomed for at least another week or two. However, troubles are liable to occur at this stage particularly in bad weather and with pigs sold as weaners through saleyards. The following are troubles occurring from this stage.

Suipestifer Infection (Salmonellosis)

Suipestifer infection is probably the most serious trouble causing losses on farms in New Zealand. The organism responsible, *Salmonella suipestifer* (or *S. cholorae suis*), is stated by some authorities to be a normal inhabitant of the intestines of pigs, which apparently only causes disease symptoms when for some unknown reason it develops a virulent character. Among predisposing factors suggested by investigators are faulty hygiene, bad housing, parasitic infestation, checks, chills, and digestive upsets, such as are caused by over-feeding with dairy by-products in spring.

The history of cases frequently shows that pigs when bought appear healthy, but after a few days develop symptoms of the disease, which spreads rapidly through the rest of the pigs on the farm. Mature pigs appear to have fairly high resistance, but pigs of all stages up to baconers are susceptible.

The disease may take one of three well-recognised forms:—

Septicaemic: The first indication that there is any trouble may be when one or two pigs are found dead with blue or purplish discoloration along the belly and possibly also in the ears. This gives rise to the name "blue belly" for the disease.

Pulmonary: The germ adopts a less virulent form, but becomes active in the lungs, causing pneumonia. Symptoms are of hurried, jerky breathing and tucked up belly, and if treatment is not given, blue areas appear on the skin and the affected animals die of pneumonia.

Necrotic enteritis: The infection is active mainly in the large intestine and takes on a more chronic form. Affected pigs scour, fall off in condition, and become miserable and unthrifty, and may develop complications such as pneumonia and die after a week or two or may recover, to become potential carriers of the disease. Post-mortem examination often shows that infection is present in lungs and intestines; in the septicaemic form there is often little abnormality visible to the eye.

As no treatment has been found which will give satisfactory results when the infection has become rampant, research in New Zealand has been directed toward developing means of preventing it. Outbreaks have occurred on farms where housing and hygiene are satisfactory, so that it cannot be said to be exclusively a dirt disease. However, the effect of good conditions and hygiene, including concrete feeding areas and clean grass runs, in permitting the pig to develop its constitutional resistance to disease to the full must be appreciated. However, the buying in of affected pigs or carriers may be even more dangerous under these conditions than where hygiene is not as good and, possibly, pigs have developed a certain amount of resistance to the pathogenic effects of the germ.

It cannot be stressed too strongly that all bought pigs should be isolated for at least a fortnight, to avoid the possibility of spread of the trouble should they develop symptoms of the complaint shortly after coming on to the farm. Even this may not completely eliminate the possibility of trouble, as carriers among the bought pigs may pass the trouble on to the stock on the farm, although their own mates appear to be immune. It is best to avoid buying store pigs altogether.

Work is proceeding aimed at the production of a vaccine which it is hoped would give adequate protection against outbreaks. However, in the meantime producers may suffer losses, and anything which offers any promise of being of value in dealing with the trouble would be valuable.

Immediate isolation, providing a good warm house for the affected pigs, is obviously the first step to be taken in every case. Veterinary advice should be obtained, as there are reports from overseas sources that appropriate doses of sulphaguanidine, sulphasuxidine, or sulphathaladine have given promising results, and a course of treatment with one or other of these drugs may result in the saving of many pigs. A treatment which is reported to have given results where pigs have shown typical symptoms of salmonellosis but which the Department of Agriculture has had no opportunity of testing is to give 10 drops of carbolic acid, spread over 3 doses—3 drops in a pint or two of warm, whole milk, the same treatment at the next feed, and 4 drops for the final dose. This may be repeated next day if necessary. An eyedropper should be used to measure the drops. Improvement is reported to take place rapidly and be complete in 3 or 4 days.

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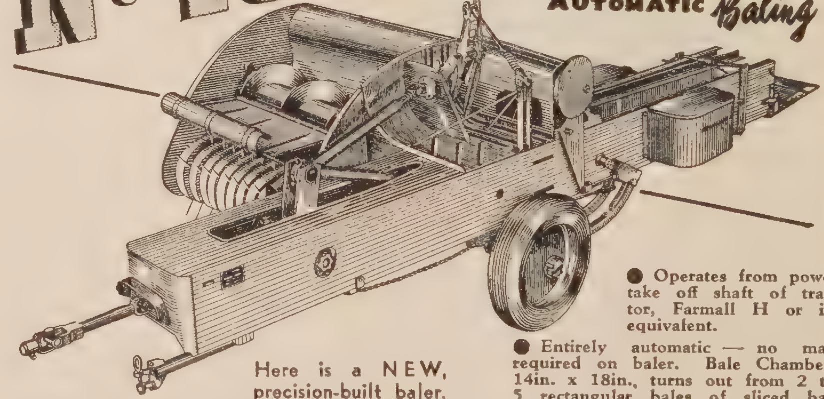

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Pasteurellosis

Many cases of pneumonia are associated with the organism *Pasteurella suiseptica*. However, pneumonia is more often a complication from other troubles, *Pasteurella* becoming harmful only when the resistance of the pig is lowered; hence the need to control other troubles which are dealt with here.

Where pigs develop pneumonia they should be isolated in clean, comfortable quarters, warmly bedded, and given a course of treatment, under veterinary supervision, of sulphanilamide. Good nursing and nourishing food complete the treatment. Pleurisy adhesions in the carcass are a direct result of pasteurellosis, and the losses associated with rejection again emphasise the need for prevention rather than cure.

Vitamin A Paralysis

Under general farm conditions where pigs are given regular access to grazing or other green foods, carrots, or yellow maize, which are all good natural sources of vitamin A, vitamin A paralysis is rare, but cases occur where pigs are housed continuously and fed wholly on dairy by-products, which are deficient in this vitamin. Affected pigs lose the use of their hindquarters, but are otherwise quite healthy. The trouble can be prevented by supplying one or more of the foods rich in vitamin A to pigs which must be housed continuously for a long period. Pigs showing symptoms of paralysis should, if possible, be given a grass run and a course of cod-liver oil.

Eversion of the Rectum

Eversion of the rectum is all too common in pigs fed on large quantities of dairy by-products, especially whey, or roots. It is most frequently met with where inadequate supplementary food is used and the pigs are not in really thrifty condition. The extent of eversion may vary from a minor eversion involving only the anus and the last inch or so of the gut to a condition in which the whole rectum is pushed out. If immediate action is not taken, it is difficult, if not impossible, to return the organ to its correct position, and amputation may have to be resorted to.

The pig should be given a dose of medicinal paraffin. The projecting mass should be washed thoroughly and, if necessary, congestion reduced by cold water and massage while the pig is suspended by its hind legs. When the organ has been reduced to normal, it should be lubricated with paraffin or vaseline and returned to its proper position. If necessary, a purse-string stitch can be run through the skin around the anus and tightened so that eversion cannot again take place, but this must be done in such a way that it will not interfere with the passage of droppings. Light, non-bulky feed should be given and the bowels kept open by allowing access to grazing or by use of medicinal paraffin, but not by purgatives.

If amputation is necessary, it should be done by a veterinary surgeon or experienced operator. It is usually necessary to stitch the two portions of the canal together above the site of amputation, to prevent the intestines escaping. However, if the eversion has taken place several days previously and the portions of the canal near the anus have started to adhere to one another, amputation may be successful without stitching. This method cannot be recommended as it is too risky, and that treatment should have been left until the stage described indicates neglect, as eversion should never be left in this way.

Infection of the Middle Ear

On most farms odd pigs develop infection of the middle ear. At first the head will be noticed to be inclined to one side, and later the pig goes round in circles, staggering drunkenly and finding it difficult to compete at the trough.

The cause is an abscess which forms in the organ of balance in the middle ear. It occurs frequently soon after weaning and is usually considered to be the result of a deficiency of the fat-soluble vitamin A in the diet. Nursing, individual treatment—because the pig is at a disadvantage at the trough—and access to clean grazing, accompanied by a course of treatment with a fish-liver oil or other rich source of vitamin A, is the usual treatment.

Though the use of sulphanilamide has been reported to give good results in the treatment of this complaint, prevention should be the aim. In this regard the main points are: Good housing conditions, avoidance of checks, particularly by creep feeding, and, at weaning, the use of a little cod-liver oil when fresh greenfeed is scarce and other forms of fat at other times until the weaning stage is well past.

Necrosis

Necrosis (necrotic ulcers, "lupus"), which takes the form of necrotic ulcers on various parts of the body, is caused by a spirochaete in association with *Bacillus necrosis*. The organisms, which are common in the soil, gain access through scratches or wounds and the ulcers form on the skin. Ulcers, if not treated, will gradually spread over the skin, forming very ugly sores.

Weaner affected with middle-ear infection.

As with other complaints treatment to be successful must be started early. The active portion of the ulcer is the outside ring and this should be scraped clean and dusted with equal parts of sulphanilamide and sulphathiazole powder, or tartar emetic. The latter is a very poisonous substance and should not be used where pigs are likely to get any of it in their mouths.

To prevent pigs receiving wounds which can lead to necrotic ulcers barbed wire and other sharp material should not be left round the piggery and husbandry practices should be adopted which reduce fighting among pigs (allowing sufficient trough space, oiling pigs before mixing litters, etc.). If wounds occur, they should be treated with a reliable disinfectant as soon as they are noticed.

On certain piggeries the trouble has been known to reach such proportions that it was practically impossible to castrate a pig without the wound becoming infected. In such cases the farrowing pens or the whole layout may have to be moved to clean ground.

It is an offence under the Stock Amendment Act, 1938, to offer for sale in a public place in New Zealand any pig affected with a necrotic ulcer.

New Foot Trouble

A form of foot trouble with which a spirochaete is associated in conjunction with *Bacillus necrosis* has recently been giving considerable concern, particularly in the northern districts of New Zealand. Investigations are still under way and no definite recommendation can be made yet. Swellings, which break out into weeping sores, occur in one or more feet, but sores do not develop into ulcers. It would appear that the organisms gain access through abrasions on the feet or legs, but there are probably other predisposing causes which are not fully understood as yet.

Most cases occur in concrete piggeries, although occasionally the trouble occurs in piggeries where no concrete has been used. Nevertheless, the evidence to date would indicate that it is important to guard against anything which may cause wounds or abrasions about the feet and legs. Damp, slippery concrete floors may be worse in this respect than those which are kept as dry as possible. Over-feeding, by causing nutritional disorders, may also be a contributory cause. Recovery is usually achieved by running affected pigs out on clean pasture on a reduced diet, but the check experienced causes considerable loss.

Parasites

The most important parasites affecting pigs in New Zealand are:—

Internal: Large roundworm of the small intestine, small stomach worm, lungworm, hydatids (cystic stage of tapeworm of the dog).

External: Lice, mange mites.

Worms

Worm infestation arises through pigs picking up the worm eggs from the ground, yards, or feed troughs con-

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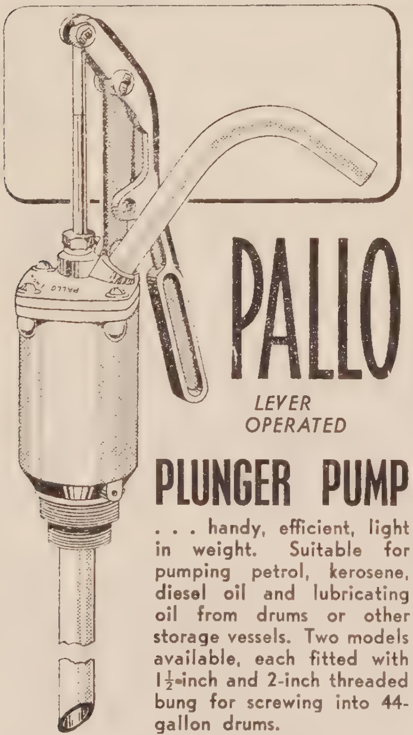

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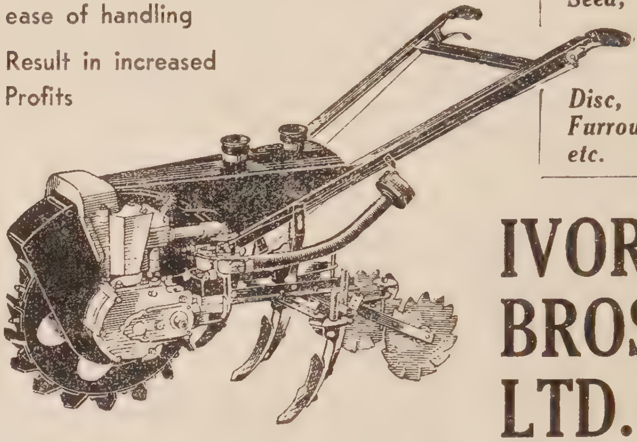

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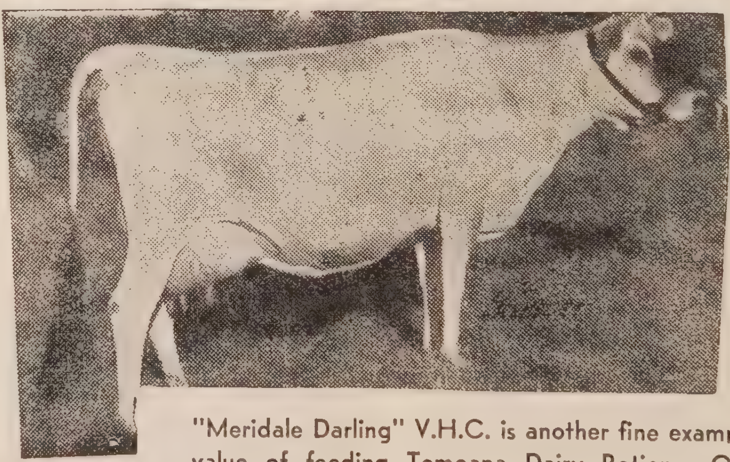

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taminated by the dung or urine (in the case of kidney worm) from infested pigs. Lungworm requires to pass through an earthworm to complete its life cycle, and thus pigs which root and pick up worms are the only ones which are liable to infestation.

The degree of infestation may vary from negligible to heavy, but rarely is it sufficiently heavy to cause death, except in suckers or weaners when gross infestation is picked up at a very early age. No accurate record is available of the incidence of worms in New Zealand, although it is certain that they are responsible for considerable loss to the pig raiser, both as a result of waste of feed through unthrifty, slow-growing pigs and their contributing directly to enteritis, peritonitis, and certain types of pneumonia. The large, roundworm (*Ascaris lumbricoides*) is the most common in New Zealand.

Sarcoptic mange on a sow.

As each mature female worm may lay up to 80,000,000 eggs in a lifetime and thousands are passed daily by an infested pig, it is obvious that unless a very high degree of sanitation is maintained pigs will become infested in some degree if confined on a small area. The viability of the eggs is remarkable, and although dry conditions and sunshine help to destroy them, it has been found in Australia that they remain viable on ground for from 11 months up to 5 years. Concrete housing with efficient drainage system to keep floors as dry as possible, regular collection and removal of dung, and prevention of soiling of food and drinking water provide the best basis for sanitation.

However, it is when infestation takes place in a litter on the sow that the results are most serious, and, therefore, the most effective control can be obtained only where the sow and farrowing quarters are freed from infestation before the litter is born. Whenever a new farrowing layout is being brought into use on fresh ground it is wise to ensure that sows are dosed for worms and, if any are present, they should be removed by dosing the sow at 3-weekly intervals before she is allowed out on to the grass run. Meanwhile all dung must be collected and removed from the new layout. The day before the sow is due to farrow she should be washed thoroughly with warm, soapy water, particular attention being paid to the udder and teats. At the same time the farrowing house, concrete yard, and troughs must be cleaned thoroughly by scraping and brushing them and then by scrubbing them with boiling water to which a little caustic soda has been added. Finally a disinfectant solution should be applied. If this system of hygiene is followed with a new layout, there should be no trouble with worms, provided that any bought pigs are put into isolation and dosed to clear them of worms before they are put into the new piggery.

If a bad infestation occurs on an existing piggery, it will be necessary to follow the same procedure as that already outlined before sows farrow, but in this case neither the sow nor piglets should be allowed out on the grass run. Turfs from clean ground can be put in the pen until the pigs are a week or 10 days old, after which the sow and litter should be carted (not driven) to a clean area, where they may be controlled in a moveable fold unit or allowed to run on the cow paddocks from an open house. The litter should be kept on the clean ground up to 4 months, according to accommodation available, or put into the fattening pens shortly after weaning.

Regular cleaning and thorough disinfection of all houses, as recommended for farrowing houses, at intervals of 10 to 14 days while a course of dosing is being undertaken will assist greatly in preventing reinfestation if pigs are kept off contaminated runs. A blowlamp or flame thrower is very effective for disinfecting walls after they have been scraped and brushed clean.

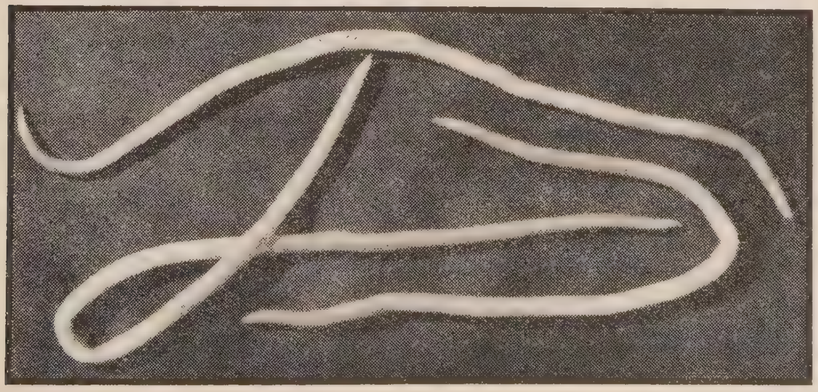
The application of principles of hygiene in management must be the first approach in control of worms. Vermifuges are all harmful in a certain measure to pigs and should be used over all pigs only if the presence of a heavy infestation has been proved to exist, and then only in conjunction with the management methods described. Oil of chenopodium, 5 parts emulsified in 95 parts of castor oil, is one of the most effective vermifuges, the dosage being 2½ to 3 tablespoons for a sucker, 3½ for a weaner (40lb.), 4 for a 60-70lb. pig, 5 for a 70-90lb. pig, 6 for a 90-110lb. pig, 7 for a 110-120lb. pig, and 8 for pigs over 120lb., including sows.

Phenothiazine is safer to use, but is generally considered to be less effective as a vermifuge for pigs. The dosage for pigs of various weights is:—

Liveweight (lb.)	**Grammes**
Up to 25	5
25-50	9
50-100	12
100-200	20
Over 200	30

Individual dosing with some degree of fasting gives most effective results, and on the day of dosing it is probably best to withold the morning feed. Dosed pigs must be kept in their house and the excreta collected and removed from the piggery area. In this way the degree of infestation and the effectiveness of the dose can be gauged.

Recently there has been a tendency to find easier ways of dosing pigs for worms, and in countries where grain feeding or other dry types of feed mainly are used sodium fluoride as 1 per cent. of the feed has proved a most effective vermifuge. With liquid food, however, it is highly toxic to pigs, and it cannot be recommended for general use in New Zealand.



Large roundworm of pigs.

DISEASES AND PARASITES AFFECTING PIGS . . .

Hydatids

The presence of hydatids in pigs is seldom suspected on the farm unless a sow or other mature animal dies and a post-mortem examination is carried out. The high incidence of the infection in pigs is evidenced, however, by the high proportion of livers which have to be condemned in the works.

Hydatid cysts are the cystic or intermediate stage of the tapeworm of the dog. Tapeworms can be controlled only by dosing infested dogs and by preventing dogs having access to uncooked sheep or pig offal.

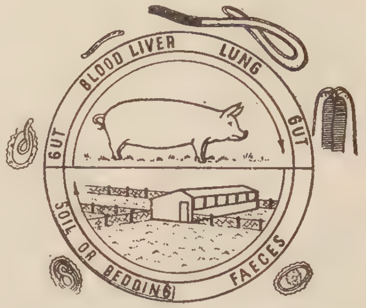
Infested dogs pass out eggs of tapeworms with faeces and if these are picked up and eaten either by pigs or humans, hydatid cysts will develop in the internal organs of the new host. Hydatids continues to be a disease of grave importance in New Zealand, and its incidence is a high price to pay for neglect to use the arecoline tablets which each dog owner pays for when he registers his dog.

External Parasites

Sucking louse: This parasite is very common in New Zealand and although farmers are generally conversant with the means of controlling it, by application of waste car oil (either by dip, spray, an oil-soaked sack on a rubbing post, or painting), it is surprising to find that lice are so frequently allowed to interfere with the production of thrifty, early-maturing pigs. The parasites cause constant skin irritation and often, because of scratching and rubbing, the skin becomes raw and may become infected with necrosis or other germs.

More effective control than that obtained by the use of waste oil can be achieved by using "Gammexane" or D.D.T. as a spray or dust.

Mange mites: Two types of mange mites affect pigs. The mites are so small that they cannot be seen by the naked eye. Sarcoptic mange is the more common and is indicated by pronounced, thick scab formation, usually along the back and behind the ears, but any part of the body may be affected. Intense irritation is caused and the pig rubs itself on walls, fences, etc. As it is highly infectious, it may spread rapidly, particularly to young pigs. The life cycle from egg to adult mite takes about 3 weeks to complete and, as the mites can exist for 3 weeks on walls, etc., effective control will depend on spelling infested houses and runs for about a month or going over walls with a blowlamp.



Life cycle of large roundworm. Eggs are passed out in the faeces and are picked up by pigs. Eggs hatch in the stomach and the larvae pass by means of the bloodstream to the lungs, whence they are coughed up and swallowed; development to the adult stage takes place in the gut. (The various stages are not drawn to the same scale, and only the head of an adult is shown.)

"Gammexane" as a spray (1 per cent. B.H.C. or 0.1 per cent. gamma isomer) is an effective agent in control, one treatment frequently being sufficient, but a repeat treatment after 10 to 14 days may be necessary. Isolation and thorough disinfection of contaminated premises are necessary. Bought pigs should always be isolated until they are proved to be healthy.

Follicular mange is a more deep-seated trouble. The mites responsible tunnel into the hair follicles, which become choked with thick cheesy material. Treatment is very difficult and seldom satisfactory, but "Gammexane" may be effective if used repeatedly before the condition has become really bad.

Both types of mange are notifiable diseases under the Stock Act, 1908, and cases must be reported to the Department of Agriculture.

Conclusion

The list of diseases affecting pigs, which have been dealt with in this and the two preceding articles of the series, while not complete, is quite formidable. It has not been prepared to create despondency in the mind of the producer, but to arm him with the knowledge with which he can avoid the serious consequences that can arise from neglect of any of the principles of hygiene and good husbandry.

If the average farmer kept records of all pigs born on the farm, he would be surprised at the percentage eventually marketed. A survey which aims to provide a true picture of losses occurring on farms among pigs is now being made, but losses undoubtedly are high.

With a knowledge of the pitfalls the farmer should be in a position to apply that knowledge to reduce losses. That can be done simply by giving pigs more consideration in relation to the activities of the farm as a whole than has been accorded hitherto.

Important Diseases not Present in New Zealand

The following are important diseases of pigs not present in New Zealand:—

Foot and Mouth Disease

Foot and mouth disease is a virus disease of cattle, which also affects sheep, goats, and pigs. It is characterised by fever and the appearance of blisters on mucous membranes and skin, particularly of the mouth and feet. It is not usually fatal in itself and can occur in benign, intermediate, and malignant forms.

Besides the symptoms already described there is loss of appetite and dullness. The blisters develop on the inner surface of the lips, dental pad, tongue, or cheeks and rupture in 1 to 3 days, leaving painful erosions. At the same time blisters may appear on the coronet pad and cleft of foot and the animal will then develop lameness.

In Britain a slaughter policy is followed. Every effort is made to keep the disease out of the country, but this is extremely difficult as it is endemic on the continent of Europe. It is far less likely to be carried to New Zealand, but if it did occur, immediate notification to the Department of Agriculture would be necessary and a policy of control would have to be followed without delay.

Swine Fever

Swine fever is a highly infectious virus disease which has occurred in New Zealand but which was quickly stamped out. It is transmitted through dung contaminating food or soil with which other pigs come in contact. Clinical symptoms develop within a few hours.

In acute cases there is a high fever, with diarrhoea and the appearance of red patches on the skin of ears, snout, inner surfaces of thighs, and round the anus. Inflammation of the membrane of the eye, with pus formation, may also be present. In the less acute or chronic form of the disease the symptoms are variable and may include either constipation or a foul-smelling, green diarrhoea. The affected animals quickly lose condition and death usually takes place within 24 hours of the appearance of the symptoms. Secondary pneumonia may complicate the symptoms. Some animals may linger a day or two and some may recover but fail to thrive thereafter.

Treatment is ineffective and not attempted. When the disease breaks out strict isolation must be applied. Destruction by burning of affected pigs and all contacts and of wooden houses, which it is impossible to disinfect thoroughly, must be carried out under the most thorough supervision.

If symptoms suggestive of this disease appear, the farmer should immediately notify the nearest Stock Inspector or Veterinarian of the Livestock Division, who will take the necessary steps to control the outbreak.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in February as follows:—

Whangarei—1XM, on February 6 and 8, at 7.30 p.m., "Feeding Pigs on Offal and Garbage," by J. Wheeler, Supervisor, Northland District Pig Council.

Auckland—1YA, on February 28, at 12.35p.m., "An Efficient Piggery: An Interview on the Farm," by H. E. Clark, Supervisor, Auckland District Pig Council.

Napier—2YZ, on February 8, at 7.15 p.m., "The Overfat Pig is not Wanted," by H. T. Donaldson, Supervisor, Tairawhiti District Pig Council.

Palmerston North—2ZA, on February 17, at 7p.m., "Don't Produce Overfat Pigs," by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Paper Holder for Apple Packing

A SIMPLE, efficient paper holder for apple packing devised by Mr. E. Milne, of Mangateretere, Hawkes Bay, which may be fitted to the usual cradle-type case holder on the fruit grader is described in this article by R. Viney, Orchard Instructor, Department of Agriculture, Hastings.

THE pieces of timber shown in the diagram are cut out according to the specifications given and holes bored as shown; 3/16in. screws are used for assembly. The 4 pieces of 15½in. x 1in. x ½in. timber used as uprights should be hardwood such as jarra, as the pieces have to stand considerable strain when the holder is in use. When assembled the holder is connected to the case holder by 2 3/16in. bolts and wing nuts, which allows the holder to be removed quickly at any time if desired.

Care must be taken in cutting and adjusting the 2 triangular blocks of wood shown in the diagram. As these pieces act as a stop to hold the paper holder in its two positions it is necessary to have them cut to the correct angles and adjusted carefully on the base board of the holder.

The paper holder is manipulated with a to-and-fro motion. When required for use the holder is pulled toward the operator and after use it is pushed forward to leave a clear passage for removal of the packed case of fruit.

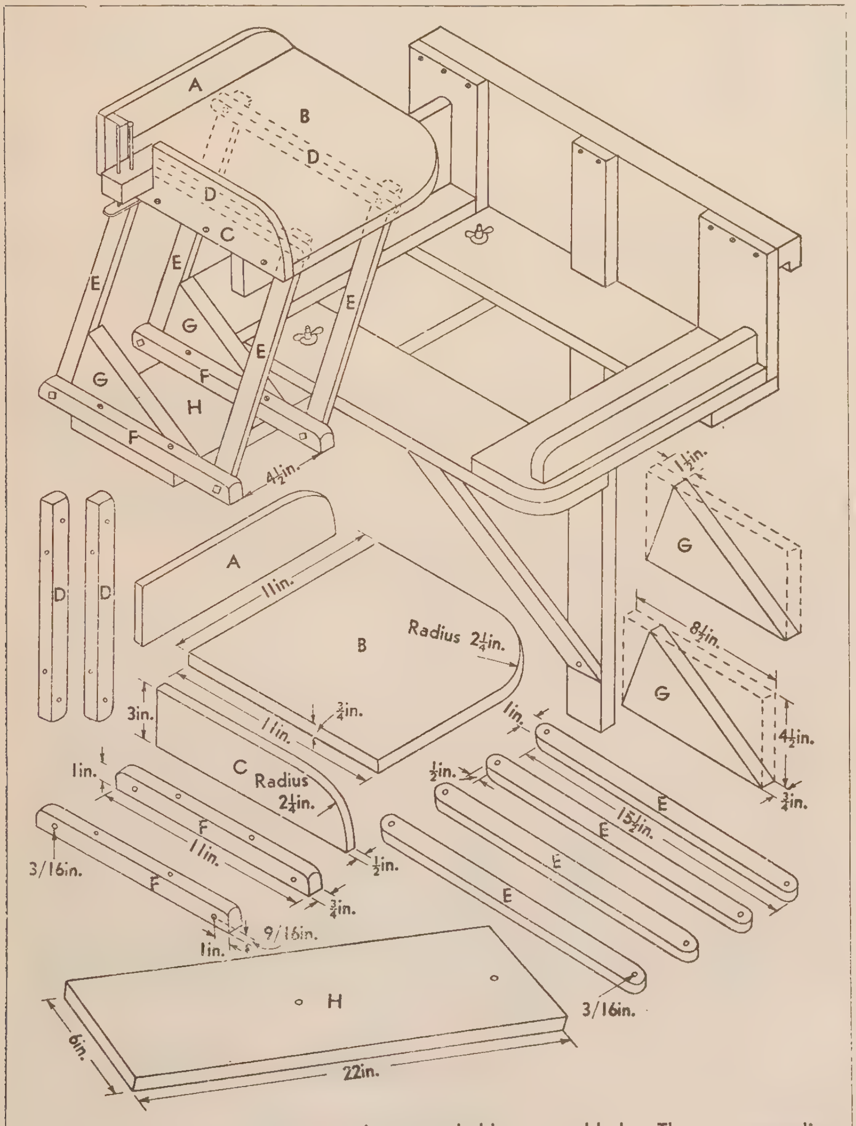
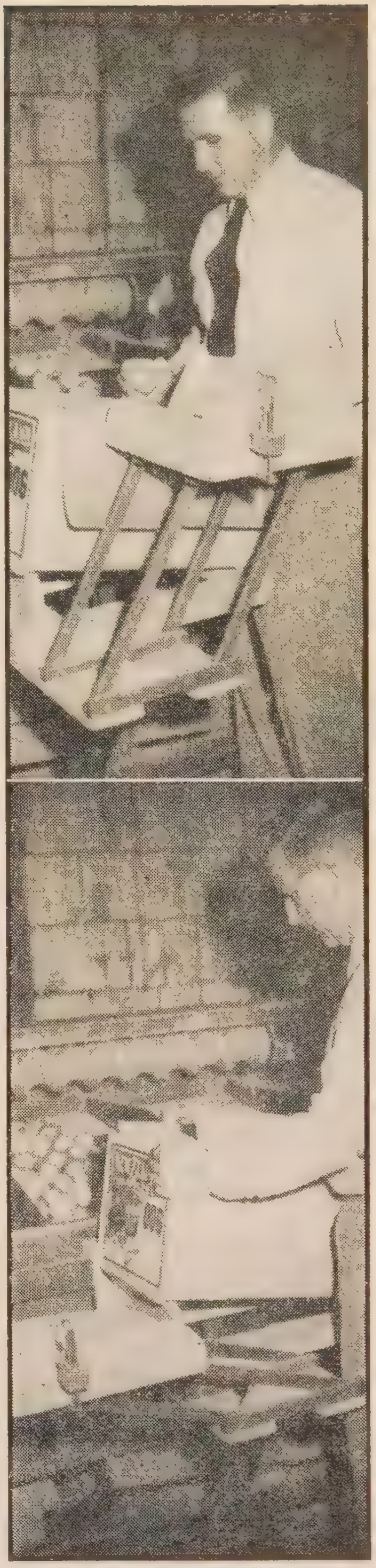


Diagram showing components, and paper holder assembled. The corresponding parts assembled and unassembled bear the same letters.



[*News-Photo Service photos.*

Upper—The paper holder in position during packing. Lower—The paper holder pushed forward to allow the packed case to be removed.

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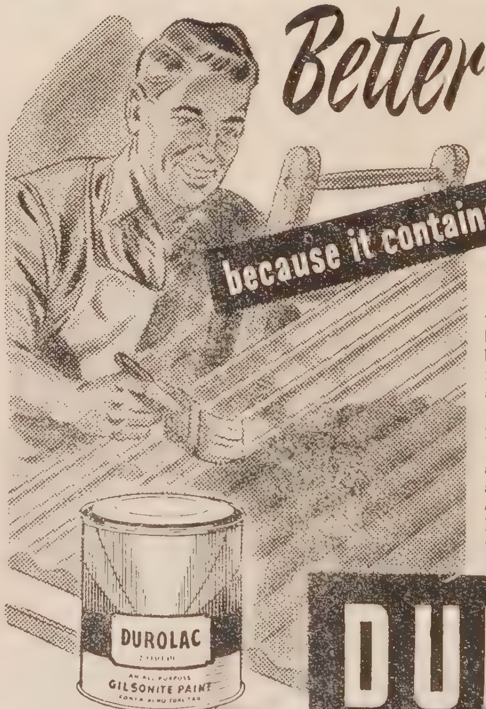

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Autumn Topdressing Increases Winter Carrying Capacity

SEASONAL NOTES Contributed by the EXTENSION DIVISION

EARLY autumn topdressing increases the autumn and early winter growth of grass and thus increases the winter carrying capacity. The practice of early autumn topdressing is important both on fat lamb and dairy farms, for on North Island fat-lamb farms the winter pasture growth determines the ewe carrying capacity and on dairy farms it limits the amount of feed which may be saved over the winter and held for the early spring feeding of the herd.

* * *

SOILS AND FERTILISERS

Some soils require phosphates only, some phosphates and lime, and some potash in addition to phosphates or phosphates and lime. The soils of New Zealand have now been named, mapped, and tested for fertiliser and lime requirements, and farmers should consult their local Instructor in Agriculture about the fertiliser requirements of their particular soils.

* * *

POTASH

Soils responding to potash are fairly widespread and heavy lime and phosphate applications will not make up for lack of potash. In the Waikato, Bay of Plenty, Taranaki, and Southland there are fairly large pastoral areas showing definite need of potash. The soils showing potash deficiency in the North Island are generally sandy loams derived from volcanic material and peats or peaty phases of the sandy loams.

* * *

POTASH TRIALS IN PIAKO COUNTY

An instance of a critical potash deficiency has been investigated on the Hunga-Hunga peaty loam near Te Aroha. The soil covers several thousand acres in Piako County, and on many farms on this area butterfat production has been falling steadily over the past few years. Newly sown pastures rapidly lost clovers even under heavy phosphatic topdressing. Trials have shown marked responses to potash; on one farm which received 2cwt. of muriate of potash per acre production was doubled in 2 years and a pasture trial strip receiving 2cwt. of muriate of potash yielded 11 bales of hay, compared with 7 bales from a non-potash treated strip.

The difference in yield of hay from North Taranaki fields treated with potash and those untreated is shown by the sizes of these haystacks in a hay trial. The stack on the left was taken from an area to which phosphates and potash were applied and the one on the right from an area to which phosphates alone were applied.

In a North Taranaki trial the section of pasture on the left was treated with 3cwt. of superphosphate and 4cwt. of potash salts and that on the right with 3cwt. of superphosphate.

* * *

POTASH TRIALS IN NORTH TARANAKI

Extensive topdressing trials carried out in North Taranaki in recent years indicate increased potash responses over those obtained in earlier trials. Responses were most marked on fields which had been cut for hay and silage; night paddocks on dairy farms showed least response. From the results of the trials the following is recommended as a suitable topdressing mixture:—

> Superphosphate or serpentine superphosphate 3cwt. and muriate of potash 1cwt. (if potash has not been used before) or at least ½cwt. of muriate of potash as an annual dressing.

* * *

SUPERPHOSPHATE; BASIC SLAG; ROCK PHOSPHATES

Superphosphate is normally the most efficient phosphatic fertiliser on soils which are not responsive to lime or on soils whose lime requirements have been fully met with lime dressings. Basic slag and North African phosphates are generally more efficient than superphosphate on soils still deficient in lime and are particularly useful on soils on which liming is uneconomic. Serpentine superphosphate is generally as efficient as superphosphate and has the added advantage of keeping in good condition during storage.

* * *

LIME

Time of application of lime is not as important as it is for fertilisers; actually lime gives its main response during dry summer weather and lime may be applied at any convenient time.

METEOROLOGICAL RECORDS FOR NOVEMBER

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
				Absolute maximum and minimum					Maximum fall		
		Approx. mean	Difference from normal	Maximum	Minimum	Total fall	No. of days of rain	Difference from normal	Amount	Date	
Kerikeri	201	60.4	+ 2.0	77.0	43.5	6.74	14		2.04	12	226.4
Auckland	160	61.4	+ 1.2	73.9	50.0	3.09	15	— 0.37	1.10	5	221.8
Tauranga	10	59.7	+ 0.9	76.4	41.7	3.90	12	+ 0.56	1.63	13	229.6
Ruakura	131	57.7	— 0.3	73.8	40.0	2.78	12	— 0.92	1.20	5	225.1
Rotorua	980	57.8	+ 1.3	77.0	38.0	3.12	9	— 1.06	1.22	13	211.2
Gisborne	12	59.3	— 0.4	77.1	37.6	3.54	14	+ 1.15	1.33	9	185.1
New Plymouth ..	160	57.6	+ 0.7	72.0	42.9	5.99	10	+ 1.28	1.73	5	246.4
Napier	5	59.5	— 0.3	76.3	41.3	3.65	14	+ 1.60	1.03	26	177.6
Taihape	2157	52.6	+ 0.1	70.2	35.2	2.70	13	— 0.62	0.72	26	
Wanganui	72	58.8	+ 1.1	75.3	40.5	2.92	12	— 0.18	0.64	8	233.0
Palmerston North	110	57.6	+ 0.6	75.0	40.2	2.70	14	— 0.57	0.93	5	200.5
Waingawa	350	55.6	— 0.5	75.1	31.0	3.80	11	+ 1.36	0.65	8	201.5
Wellington	415	55.2	— 0.4	71.4	41.1	4.52	11	+ 1.34	0.88	21	210.9
Nelson	24	56.9	— 0.3	73.4	38.7	5.33	11	+ 2.39	1.98	20	241.9
Blenheim	12	56.6	— 1.4	80.2	33.9	2.66	8	+ 0.88	1.37	20	242.5
Hokitika	12	53.2	+ 0.3	64.9	34.1	4.60	13	— 5.94	1.72	24	223.7
Hanmer Springs ..	1225	51.6	— 2.5	80.0	25.0	6.01	9	+ 2.54	1.55	20	213.2
Christchurch ..	22	55.8	— 0.5	83.5	32.1	1.40	12	— 0.40	0.48	3	238.1
Ashburton	323	55.4	+ 0.1	82.2	34.0	3.00	11	+ 0.57	0.79	26	199.9
Timaru	56	55.1	+ 0.5	84.8	31.4	1.31	8	— 0.63	0.37	8	206.0
Alexandra	520	57.4	+ 1.0	83.8	28.8	0.44	5	— 0.72	0.12	25	287.2
Taieri	80	52.8	— 0.6	80.4	31.3	1.74	10	— 0.61	0.81	25	
Invercargill ..	32	53.0	+ 0.7	77.0	33.0	1.65	15	— 2.46	0.56	25	233.5

☆

Fruit Crop Estimates for November, 1949

THE following estimates of the fruit crop for November, 1949, in 000's of bushel cases, are provisional and revised monthly for the period November to March and are summarised from information supplied by field officers of the Horticulture Division, Department of Agriculture.

FRUIT	DISTRICT									
	Auckland	Gisborne	Hawkes Bay	Manawatu Wanganui	Wairarapa	Nelson	Marlborough	Canterbury North Otago	Central Otago	Total
APPLES—										
Ballarat	57	10	90	1	2	5	5	6	—	176
Cox's Orange Pippin ..	8	4	80	1	1	120	9	13	3	239
Delicious	37	11	110	1	5	169	8	17	17	375
Dougherty	21	5	70	—	—	24	1	—	—	121
Granny Smith	69	3	85	2	2	66	1	1	1	230
Gravenstein	26	—	35	—	—	43	—	—	—	104
Jonathan	11	—	50	—	2	249	18	10	6	346
Sturmer	6	5	200	2	15	310	20	36	10	604
Other varieties	107	6	166	7	5	132	14	44	11	492
Total	342	44	886	14	32	1118	76	127	48	2687
PEARS—										
Beurre Bosc	3	—	2	—	—	5	—	—	—	10
Louise Bonne de Jersey	—	—	10	—	—	—	—	—	—	10
Packham's Triumph ..	6	—	3	—	—	1	—	—	—	10
P. Barry	2	1	8	—	1	2	—	—	—	14
W. B. Chretien	11	—	40	1	—	18	—	1	7	78
Winter Cole	2	1	30	—	1	31	1	4	2	72
Winter Nelis	—	1	30	—	—	6	—	1	5	43
Other varieties	13	1	8	1	—	8	—	5	2	38
Total	37	4	131	2	2	71	1	11	16	275
OTHER FRUITS—										
Peaches	60	6	166	—	—	30	—	4	43	309
Apricots	1	—	4	—	—	—	—	5	71	81
Nectarines	1	—	14	—	—	1	—	—	9	25
Plums	35	5	32	1	—	3	—	3	20	99
Cherries	—	—	1	—	—	—	1	3	9	14
Quinces	8	—	9	—	—	5	—	—	—	22

SHOW DATES

THE following are dates and venues of A. and P. shows up to early March.

February 3 and 4—Buller A. and P. at Westport.

February 4—Golden Bay A. and P. at Takaka.

February 4—Palmerston and Waihemo A. and P. at Palmerston.

February 4—Rodney Agricultural Society at Warkworth.

*February 4—Woodville A. and P. at Woodville.

February 4—Clevedon A. and P. at Clevedon.

*February 7 and 8—Dannevirke District A. and P. at Dannevirke.

February 10 and 11—Rangitikei A. and P. at Taihape.

February 10 and 11—Taranaki A. and P. at New Plymouth.

February 11—Murchison A. and P. at Murchison.

February 11—Waitemata A. and P. at Waiwera.

February 11—Hukerenui A. and P. at Hukerenui.

February 11—Katikati A. and P. at Katikati.

*February 11—Pahiatua A. and P. at Pahiatua.

February 11—North Kaipara Agricultural Association at Paparoa.

February 15 and 16—Ohura A. P. H. and I. at Nihoniho.

February 16—Christchurch Stud Ram Fair at Christchurch.

February 17 and 18—Franklin A. and P. at Pukekohe.

February 17 and 18—Masterton A. and P. at Masterton.

February 18—Northern Wairoa A. and P. at Mititai.

February 18—Te Puke A. and P. at Te Puke.

February 22—Te Awamutu A. and P. at Te Awamutu.

February 22—Opotiki A. and P. at Opotiki.

February 25—Putaruru A. and P. at Putaruru.

February 25—Waipu P. and I. at Ruatoria.

*February 25—Whakatane and Rangitaiki A. and P. at Whakatane.

February 25—Waimarino A.P.H. and I. at Raetihi.

February 28—Otorohanga A. and P. at Otorohanga.

March 4—Amuri A. and P. at Rotherham.

March 4—Temuka and Geraldine A. and P. at Winchester.

March 4—Maniototo A. and P. at Ranfurly.

*March 4—Mangonui County A. and P. at Kaitaia.

March 4—Albany A. and P. at Albany.

March 4—Matamata A. and P. at Matamata.

March 4—Waiotira Junction A. and P. at Waiotira.

March 8—Morrinsville A. and P. at Morrinsville.

* The Department of Agriculture Exhibit will be staged at this Show.

Some Spring-flowering Bulbs Need Early Planting

THOUGH spring-flowering bulbs, such as narcissi, hyacinths, and tulips, frequently are planted in March and April, and even in May, there are other kinds which for best results should be planted during February. Strange as it may seem, among these are many which flower after the later-planted bulbs are over, the Spanish, Dutch, and English irises being examples. Apparently these plants require a longer period in which to develop their growth. In addition, their bulbs depreciate in vitality if they are lifted and kept out of the ground for any length of time. Therefore it is advisable to attend to their planting early, and that is the main theme of this month's article for the flower gardener by M. J. Barnett, Director of Reserves to the Christchurch City Council.

[Green and Hahn Ltd. photo.

Calceolaria, raised from seed sown in January, photographed in full bloom in November.

FOLLOWING is a list of bulbs which are better planted in February:—

Irises

Dutch irises and their counterparts, the Spanish irises, are most useful both in the flower border and for cut flowers, as they come into full bloom when tulips and most spring flowers are over and before rose blooms appear. The bulbs should be planted a few inches apart in small groups or clumps. Given a reasonably good soil and a well-drained position, they will succeed for several years without being disturbed. Popular varieties to grow are Imperator, Rembrandt, Wedgwood, and Yellow Queen.

Spanish irises are similar in habit and requirements to the Dutch kinds, but they have the advantage of having longer and more slender stems and they flower about a fortnight later. If anything, they are more successful in a warmer and better-drained soil than the Dutch irises.

English irises probably are hardier than either the Dutch or Spanish kinds, but they prefer a cooler soil provided it is open in texture and not wet and sticky. Dry, hot conditions they will not tolerate. The flowers, which appear in December, are much larger than those of either the Dutch or Spanish irises. King of the Blues, which has flowers of rich violet-blue, is the most popular variety, but other varieties in colours of soft blue, mauve, and white are obtainable. For the best effect in the flower border the bulbs should be planted a few inches apart in groups of a dozen or more.

Iris tingitana, a species from Tangier, is undoubtedly one of the most beautiful of all the bulbous irises. It is by no means difficult to grow, especially in warm, well-drained soils, but inducing it to flower profusely presents a problem. Some growers advocate lifting the bulbs each year after the foliage has ripened off and giving them a thorough baking in the full blaze of the sun for a period before replanting them; others have tried this with indifferent success. As it flowers in late winter and early spring and provides an admirable cut flower, *I. tingitana* will always be in demand. Like many of the other plants which come from North Africa, in its native habitat it must undergo a long, hot, dry summer which thoroughly ripens the bulbs, and they are forced into complete rest for some months. Cooler and moister conditions, plus the warmth retained in the soil, induce rapid growth, followed by the flowering period. The problem in New Zealand is to provide as nearly as possible the conditions that the plants experience in their native habitat.

The peacock iris (*Iris pavonia*) is a dainty native of South Africa. It has slender, upright, grasslike foliage and large blue and purple flowers. Though it succeeds in a fertile soil, it demands perfect drainage, and for this reason is more suitable for the rock garden than for the open border. It flowers freely during October and once established does not require to be disturbed for several years.

Iris reticulata is the earliest of the bulbous irises to flower. In a mild season it comes into bloom at the end of winter. Though a well-drained situation is usually recommended for it, it has been found to succeed quite well in any average garden soil. It thrives equally well in a rock garden if given a cool situation. The rich royal purple flowers with gold markings are most attractive at a time of year when there is a dearth of colour in the garden.

Crown Imperial

Though the crown imperial (*Frittilaria imperialis*) is a native of Palestine and Asia Minor, it has been under cultivation in all temperate countries for many hundreds of years. It dislikes wet, cold soils, but it grows to perfection in a deep, rich, well-cultivated one. The best plants the writer has seen were grown in a fertile loam that previously had been manured heavily with half-rotted cow manure. The manure had been placed fully 15in. below the surface level so that there was no fear of the bulbs coming into contact with it when they were planted.

This rule should apply when using any organic manure to improve the quality of the soil where bulbs are to be planted. The bulbs must not be allowed to come into contact with such substance or decay may set in. The roots from the bulbs should be allowed to find the manure.

Many growers, when planting fleshy, soft-skinned bulbs such as the crown imperial and lilies, surround each bulb with a pocket of sharp sand, which prevents any acid or decaying matter in the soil from coming into contact with the bulb and thereby providing the initial cause of decay.

The bulbs of *Frittilaria*, which incidentally have a most unpleasant smell, deteriorate rapidly if left out of the ground for any length of time.

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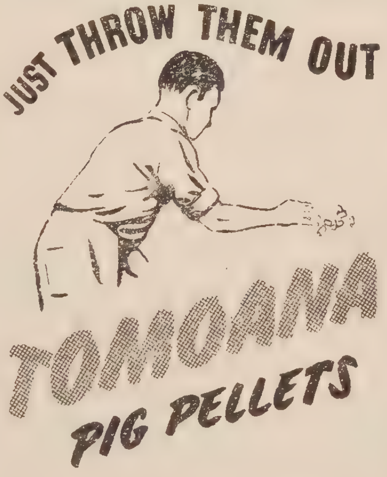

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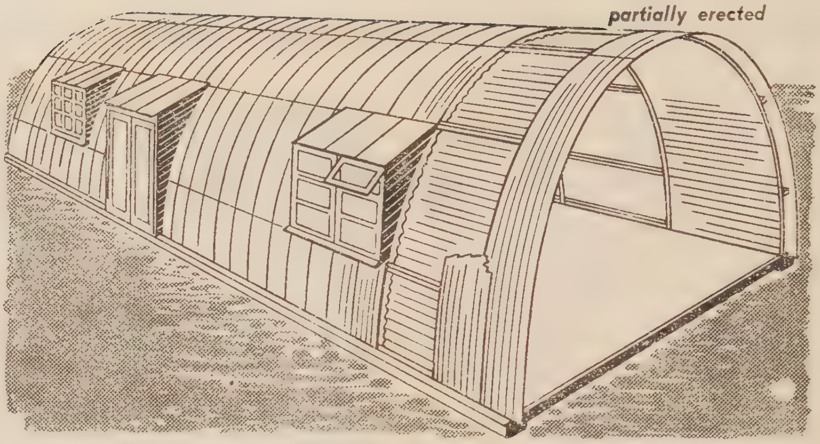

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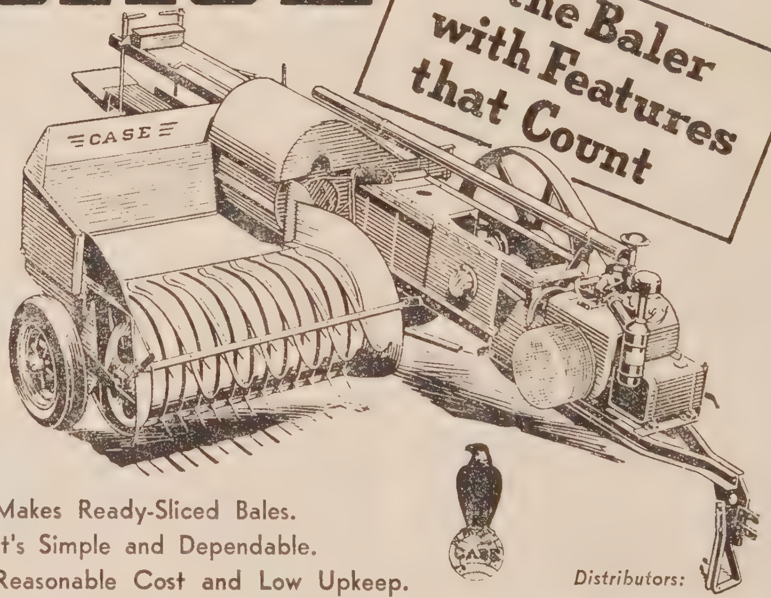

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WORK IN THE FLOWER GARDEN

[*Douglas Elliott photos.*

Erythrina crista-galli (left), a shrub sometimes referred to as the coral bush or coral flower, though a native of the tropical and subtropical regions, is perfectly hardy in most parts of New Zealand. If given a warm situation, it seldom fails to flower during late summer and autumn. Strong growths arise from the woody rootstock each year, make rapid growth, and develop large racemes of gorgeous red flowers which are not unlike the New Zealand clianthus or kaka beak. It is a most striking plant when in full bloom. After they have flowered the growths are cut right back to the woody rootstock. The plant is frequently called Christ's thorn because of its extremely thorny stems and its red flowers, but it is in no way associated with the Crucifixion. It is generally accepted that the true Christ's thorn is the *Paliurus*, a wiry-branched shrub from Palestine with sharp, hooked spines. *E. humeana* (right) is not as hardy as *E. crista-galli*, but succeeds in the warmer parts of the Dominion. It grows into a tree and has brilliant scarlet flowers. *E. speciosa* is another bushy species, with deep crimson flowers.

In England the crown imperial is sometimes used for spring bedding, the method being: The bulbs when ready are potted into 5in. pots and started into root growth; in autumn, when the flower beds are cleared of their summer-flowering subjects and dug over, the bulbs are knocked out of the pots with the soil and roots intact and planted carefully where they are to flower. Thus the bulb does not deteriorate through remaining out of the ground until the usual planting time in autumn.

The crown imperial may be obtained in three distinct colours—bronze, red, and yellow.

Frittilaria meleagris, one of the wild flowers of England and Europe, is also a desirable plant for the garden, especially for naturalising in the cool, open spaces among shrubs. It grows to a height of only about 12in. and the pendulous, bell-like flowers are borne on slender flower stalks. The type has deep purple-speckled flowers, but there is also a white form which is well worth obtaining. Once established in a suitable situation the bulbs require little attention and should be left undisturbed.

Freesias

Though freesias may be grown outside safely in the warmer parts of New Zealand, and may even be grown successfully in warm, sheltered positions in less favourable districts, they can be grown by anyone who has a greenhouse or conservatory available by the following method: Five-inch pots are prepared in the usual way and two-thirds filled with a good compost. After the compost has been firmed and the surface made even, the bulbs are inserted about 2in. apart and covered to a depth of about 1in. with more compost. The pots containing the bulbs are then stood in a frame or in a sheltered position and kept reasonably moist until the foliage appears, after which they require more frequent watering. If they are protected from cold winds and early frosts, the pots can remain in the frames until toward the end of April, when they should be transferred to the better protection and warmer atmosphere of the geenhouse. Freesias must have plenty of light and they dislike humid conditions.

The variety *F. burtoni* is the largest of all freesias and has large, creamy white flowers. The introduction of new hybrids has increased the colour range considerably and now lavender, mauve, pink, yellow, and orange varieties can be obtained from any seedsman.

Lachenalias

Similar treatment and conditions to those recommended for freesias are required by lachenalias with the difference that they prefer a more open compost. They are also admirably adapted for growing in hanging baskets.

Grape Hyacinth

The grape hyacinth (*Muscari*) succeeds almost anywhere and increases rapidly. Though it is common, it is one of the most useful bulbous plants for massed effect or for naturalising underneath or in the vicinity of deciduous shrubs.

Anemones

Anemone coronaria (the florists' anemone) required for early flowering should be planted during February. If possible, they should have a well-drained site that is warm and sheltered and friable soil that has been well worked.

Lawn Mowings as a Mulch

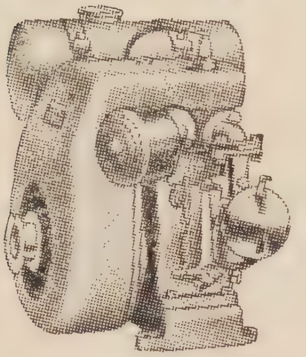
The use of fresh lawn mowings from the grass catcher for mulching round shrubs such as rhododendrons, azaleas, and roses is not uncommon. Such a mulch of green material when spread too thickly can do much harm. If the soil tends to be dry at the time, the green mulch will not improve its condition but rather make it worse. The green material ferments rapidly and during the fermentation heat is generated, drying up the surface moisture in the soil.

A thin sprinkling of the grass hoed into the surface may give some benefit, but the better plan is to place all such material on the compost heap, where it will be decomposed into valuable material for enriching the soil of the garden, either as a mulch or by being dug in.

Iceland Poppies

If Iceland poppies are required for early flowering, the seed should be sown now in seed trays and kept in a cool, shaded position until it has germinated. After germination more light, but not direct sunlight, should be given. When the seedlings are large enough to be

Tough



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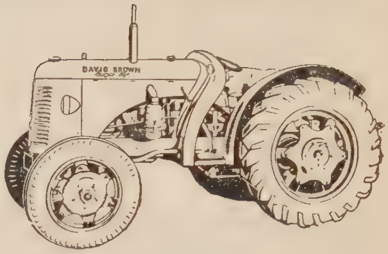

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handled they can be pricked off into boxes containing a richer medium and grown on. As soon as the young plants have established themselves the boxes should be stood in a cold frame and shaded from bright sunshine for a few days until the foliage has hardened.

Iceland poppies are cool-loving plants and do not like high temperatures. Where hot weather and dry winds are experienced the difficulty is to maintain cooler conditions which will promote more healthy growth. However, with the advent of cooler weather the plants usually respond, and by the end of April they will have made sufficient growth to warrant their being transplanted to the open where they are to flower.

Removing Seed Heads

Many plants now in flower, such as the sweet scabious, will cease to bloom if allowed to produce seed. By systematically removing the seed heads as soon as they appear the flowering period may be extended considerably.

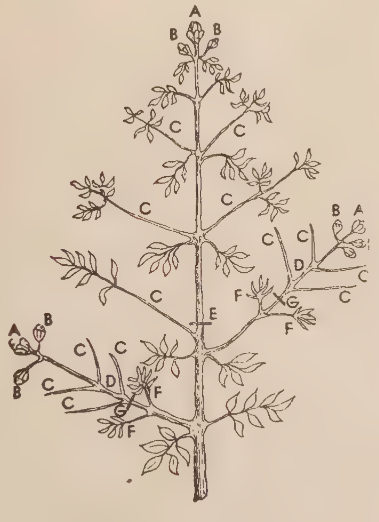
Spraying Chrysanthemums

Late-flowering chrysanthemums should be sprayed regularly with lime sulphur and with arsenate of lead to combat attacks of mildew and leaf-eating caterpillars, which in one night can destroy an otherwise promising flower bed.

Plants under Glass

Continue to pot on cinerarias as soon as they are sufficiently forward.

Sow a batch of seed of schizanthus for winter flowering.



The disbranching of dahlias. A—Terminal buds to remain. B—Side buds to be removed. C—Side shoots or laterals to be removed. D—Laterals to be retained. E—The point at which the main stem is removed after it has flowered. F—Sub-laterals to take the place of the laterals D when they are removed. G—The points at which laterals are removed after they have flowered.

WORK IN THE FLOWER GARDEN

[Douglas Elliott photo.

Datura sanguinea (also known as *Brugmansia*) is a native of Peru and loves warmth, but it may be grown in most parts of New Zealand where winters are not severe. In favourable situations it grows into quite a large shrubby bush 10ft. high or more. The large leaves are densely covered with hairs or down, enabling it to withstand comparatively long periods of drought. The flowers, which are long, large, tubular or funnel shaped, and pendulous, have a reddish colour and are very conspicuous. As the bush flowers throughout late summer and autumn it is an interesting and attractive plant for a warm corner in the garden. Other good daturas are *D. suaveolens*, which has large, sweet-scented white flowers, and *D. wrighti*, which has magnificent, large, white flowers with the faintest trace of blue in them. There is a double form named *D. knighti* which some gardeners consider the best of all. If they are protected from cold, biting winds, all these daturas thrive near the coast.

Begonias should now be in full flower and will require staking and feeding. All female flowers should be removed as soon as they appear.

Dahlias

Gardeners who specialise in dahlias and aim to exhibit their blooms on the show bench have their own methods of training, disbranching, and disbudding their plants. When large super-flowers are required it is usual to allow only one strong leader to grow and develop from the tuber. This leader or stem is staked securely and allowed to grow until the first cluster of flower buds forms at the top. The centre or terminal bud, which is usually the largest, is retained and all the others are removed. The side branches or lateral growths for a distance of 1ft. or further down the stem are removed at their point of union with the stem, but the leaves remain. This "disbranching," as it is called, induces the growth of a longer and straighter flower stem. Below this point some of the lower side shoots are left to produce flowers in their turn. When the terminal flower has passed or been removed the stem is cut back to the first lateral shoot that is developing; this shoot is disbudded in the same way as the first stem—that is, only the central bud of the cluster is retained. Likewise, the side shoots or sub-laterals are removed down to the bottom pair, which in turn replace the first lateral when it has flowered, and so on to the end of the flowering season.

If two or more shoots are allowed to grow from the tuber, each shoot or leader can be disbudded and disbranched in the same manner as if there were only one.

Another method is to disbranch all but the two lateral shoots nearest the ground. Some growers desiring to have the best blooms ready at a certain time cut back the first growth before it flowers and train up the strongest of the laterals after the others have been removed.

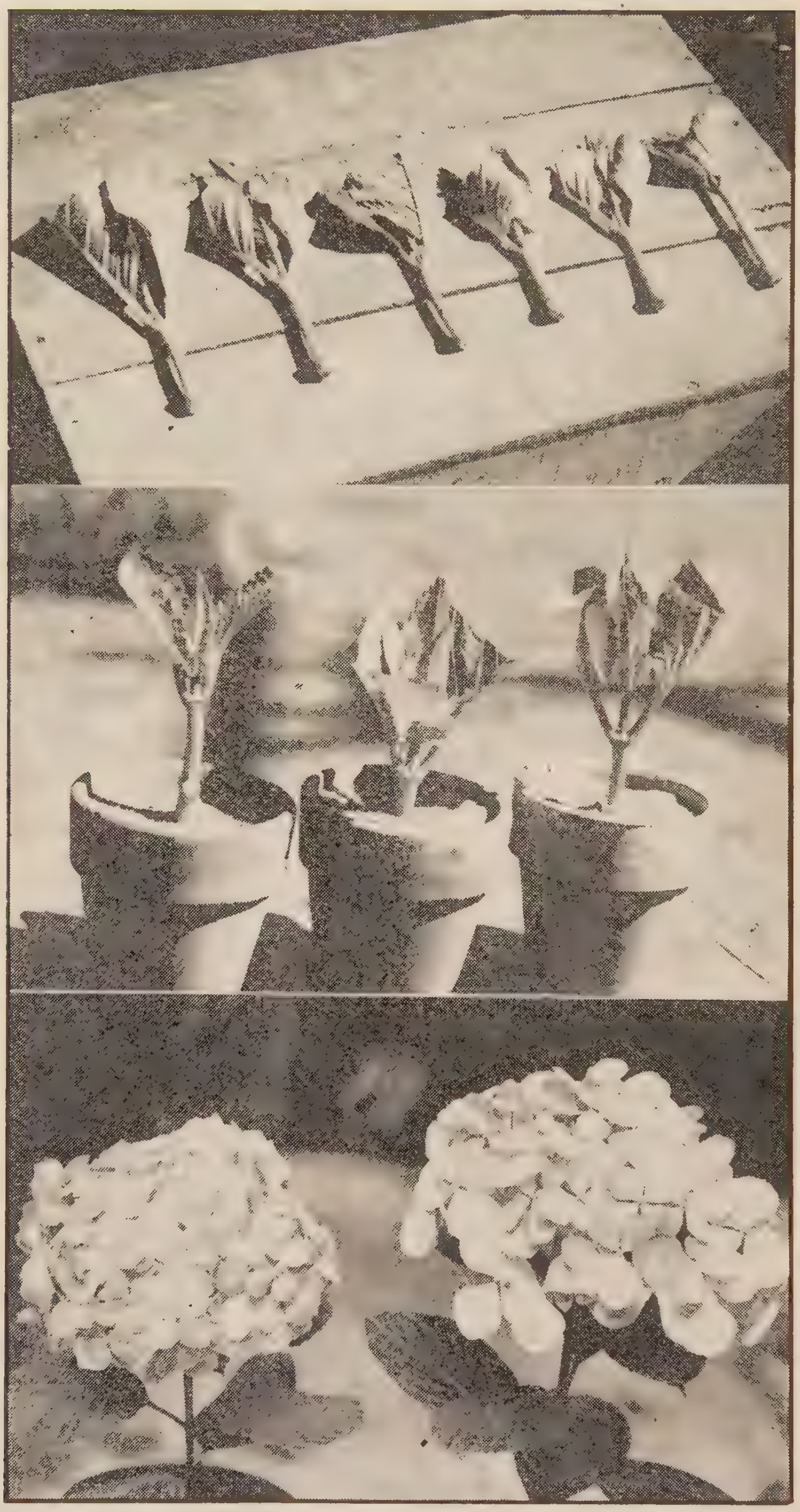
No matter what method is adopted, if the plants are to continue in bloom, the flower heads should be removed as soon as they are over, and the stems that are past flowering should be cut back to the more vigorous lateral growths.

Dahlias are greedy plants, and the soil around the roots must not be allowed to dry out.

Hydrangeas as Pot Plants

Hydrangeas are not only among the best of flowering shrubs for favourable situations in the flower garden, but they are also excellent when grown as pot plants for producing a good display in a cool greenhouse during November and December. Such plants often produce blooms which are

WORK IN THE FLOWER GARDEN



[*Green and Hahn Ltd photos.*

Upper—Cuttings of soft tips of hydrangeas prepared for insertion in pots. Middle—The cuttings inserted singly in 3in. pots and ready to be plunged in a cold propagating frame. Lower—Hydrangeas grown from cuttings taken in February blooming in November.

much larger, cleaner, and of better colour than those grown in the open. The method of growing the plants for the greenhouse is as follows:—

At the end of January or early in February cuttings are selected from the strong, sturdy growths that are showing no indication of flowering. Only the soft tips or ends of the shoots are taken. The bottom pair of leaves is removed close to the stem, which is cut squarely just below the node or joint. To prevent excessive loss of moisture by transpiration the upper pair of leaves may be shortened to half their size. Each cutting is then inserted in a hole made with a dibble in a 3in. pot filled with a sandy compost. The cutting should be made firm by pressing the dibble downward and inward toward the base. If a cutting can be removed easily with a slight jerk of the finger and thumb, it is not as firmly fixed as it should be. After sufficient cuttings have been inserted the pots should be plunged to the rims in sawdust or similar material in a close frame, shaded from the sun, and given a good watering. The aim should be to maintain an even temperature during the following few weeks; frequent syringing with water during hot and dry weather will prevent the cuttings flagging and promote growth.

Within a month the cuttings should be rooted sufficiently to warrant their being removed from the frame to the bench in the greenhouse, where they are grown on until they are ready for potting into 5in. pots and a richer compost. The time for potting on is easily ascertained by examining the plants from time to time. When the roots begin to work to the outside and fill the compost is time enough, but the move should not be left until the plants are pot bound. The rule should be to keep them moving without a check.

With the approach of winter, growth will cease and the plants will show every indication that they desire to rest, and at this stage watering must be done more carefully, though the soil should not be allowed to become dry. It is peculiar that many plants grow and flower better after they have been submitted to a colder temperature, and for that reason many growers customarily remove the plants from the greenhouse to a cold frame for about 3 weeks during midwinter. Even a temperature in the frame of 25 degrees F. is not sufficient to harm them. After the plants have had their "wintering" in the frame they are taken back to the greenhouse, and when growth restarts in early spring they can be potted on to larger pots. However, they can be flowered in the 5in. pots if they are fed regularly with liquid manure. When the flower buds appear the plants should be given every attention and encouraged to make steady growth by regular watering, syringing, attention to ventilation, and feeding.

The plants are not difficult to grow and are comparatively free from disease. Greenfly sometimes attacks the young growth, but this pest is easily destroyed by fumigating with any of the nicotine compounds available from seedsmen. When the plants have finished flowering they may be planted out in the open and grown on in the usual way.

WAYS OF USING THE TOMATO CROP

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TOMATOES are a useful food, for there are endless ways of using them. While they are plentiful they can form part of any meal, and the surplus can be preserved for future use. Chutneys, relishes, pickles, and sauces with tomato as the main ingredient are always in demand to add flavour and interest to winter dinners. Methods of bottling tomatoes were described in the "Journal" for October, 1946, and in this article Eva Topping, Rural Sociologist, Department of Agriculture, Auckland, gives ways of using the fresh fruit and recipes for pickling.

PEOPLE who saw the film "Meet Me in St. Louis" may remember the sequence in which the whole family came into the kitchen to taste and pass judgment on the flavour of the tomato ketchup. Several recipes for this condiment are given to allow a choice which will best suit the family's tastes.

Recipes Using Fresh Tomatoes

Tomato and Cheese Mould

1½ cups of tomato puree
¼lb. of grated cheese
1oz. of gelatine
Salt and pepper

Soak the gelatine in ½ cup of water. Simmer the tomatoes in a covered saucepan, strain them, and measure 1½ cups of pulp. Add the dissolved gelatine and cheese, then pour the mixture into wetted moulds. Slices of hard-boiled egg may be put in the bottom of each mould and chopped parsley added. Set in jelly jars or other small, covered pots, these moulds make an excellent dish for the schoolchildren's lunch box. In winter bottled puree, tomato halves, or soup can be used.

Tomato Paste for Sandwiches or Savoury Biscuits

4 tomatoes
1 small onion
1oz. of butter
Pinch of herbs or chopped mint
3oz. of grated cheese
1 egg yolk
1 tablespoon of brown breadcrumbs

Skin the tomatoes and cut them up; chop the onion finely. Melt the butter, add the onions and tomatoes, and cook them gently until they are soft. Then add the egg yolk and stir well. Take the saucepan off the heat, add the breadcrumbs, cheese, and seasonings, and mix them well.

This is one of the Department of Health recommendations for school lunch sandwich fillings. Spread on brown bread and butter it makes a delicious, healthful lunch.

Tomato Cutlets

½lb. of tomatoes
½lb. of lentils
¼lb. of chopped onion
Pinch of thyme
¼lb. of breadcrumbs
½ pint of water or stock
Teaspoon of yeast or meat extract
Salt and pepper

Cook the lentils and onions in water or stock until they are quite soft. Add the skinned tomato and cook it until it is "mushy." Stir in the yeast or meat extract, seasonings, and breadcrumbs, making a stiff paste which can be formed into rissoles or cutlets. Bake or fry them until they are brown and hot right through. Serve them with gravy and jacket potatoes for lunch.

Cream Tomato Soup

1 rounded tablespoon of cornflour
1 small onion
1 small carrot
½ cup of milk
1½lb. of tomatoes
1 pint of white stock or water
Sprig of thyme
3 or 4 bacon rinds
½ to 1 tablespoon of dripping or butter
Salt and pepper

Blend the cornflour with a little of the stock or water. Fry the onion and bacon rinds in the fat, add the tomatoes roughly sliced, diced carrot, thyme, salt, pepper, and stock. Simmer the mixture gently until it is pulpy. Sieve it and bring it to the boil again. Add the cornflour and stir until it is cooked. Then add the milk, but do not boil the soup after the milk has been added. Serve it sprinkled with chopped parsley.

Cheese Tomato Savoury

1 large onion, grated
3oz. of mild dripping or butter
2 eggs
A little Worcester or tomato sauce
3oz. of cheese, grated
4 finely-chopped tomatoes
½ cup of soft breadcrumbs

Heading photograph by Sparrow Industrial Pictures Ltd.

MAKING USE OF THE TOMATO CROP . . .

Simmer the onion in a little water, add the fat and tomatoes, and simmer them until they are cooked. Cool them, and add the grated cheese, stirring well, then the beaten eggs, sauce, and breadcrumbs. Stir the mixture over a gentle heat until it thickens. Pour it into a greased pie dish and set it in a moderate oven until the savoury is slightly browned on top.

Tomato Appetisers

Frosted Tomatoes

1 small onion
1 teaspoon of salt and pepper
½ teaspoon of curry powder
4 peeled, large, ripe tomatoes
1 tablespoon of chopped parsley
3 tablespoons of thick salad dressing

Chop the tomatoes and onion into quite small pieces, add the salt and pepper, and put them into the freezing tray until ice crystals start to form. Mix the salad dressing, parsley, and curry powder. Arrange the frosted tomatoes in individual dishes and pile the curried dressing on top.

Tomato Cocktail

2lb. of ripe tomatoes
2 thin strips of lemon rind
1 to 2 teaspoons of Worcester sauce
1 sprig of thyme
3 thin slices of shallot or onion
2 teaspoons of sugar
Salt and pepper

Slice the tomatoes roughly and put them into a pan with the lemon rind, thyme, shallot, and seasonings. Simmer them gently until the fruit is pulped. Put the mixture through a fine strainer. Add Worcester sauce, sugar, and lemon juice to taste. Thin the cocktail with water if necessary, then chill it and serve it in small glasses.

Tomato Salads

Tomato Jelly Salad

1 pint of stewed tomato pulp
1 finely-chopped onion
Salt and pepper
Lettuce
1 teaspoon of sugar
¼ teaspoon of celery salt
1 clove
1 dessertspoon of gelatine
Salad dressing

Cook the tomato pulp with the onion, clove, and seasonings until it is well flavoured. Rub it through a coarse strainer. Add the sugar and gelatine, dissolved in 2 tablespoons of cold water, and stir it thoroughly. Pour the mixture into a mould previously rinsed in cold water and leave it to set. When the salad is firm, turn it out on to a large plate or dish; dip the mould first into hot water, then into cold, so that the salad turns out without breaking. Surround it with shredded lettuce combined with salad dressing.

Tomato-cheese Salads (6 servings)

8 tomatoes, 6 of them large and even shaped
1 level dessertspoon of chopped onion
1 teaspoon of cornflour or arrowroot blended in a little cold water
Lettuce
4 cloves
Salt and pepper
2oz. of processed cheese or cream cheese

Cut a circle from the flower end of each of the 6 large tomatoes and scoop out the pulp with a teaspoon, leaving the shells intact. Put the pulp and the other tomatoes into a saucepan with the onion, cloves, 4 tablespoons of water, and seasoning. Stew the mixture until the ingredients are soft, sieve it, add the cornflour, bring it to the boil, simmer it for 5 minutes, and cool it. Stuff the tomatoes with layers of puree and softened cheese, having cheese for the top layer. Decorate them with piped cheese or parsley and serve them in lettuce leaf cups. Packet or processed cheese can be softened with a little top milk or cream.

Other Ways of Using Tomatoes

The surplus tomato crop can be used in chutneys, relishes, and sauces, which make for variety and interest in the menu. Most country housewives have their favourite ways of making these appetisers, but some recipes are given for the benefit of those who have not yet had time to gather a store of tried and trusted methods.

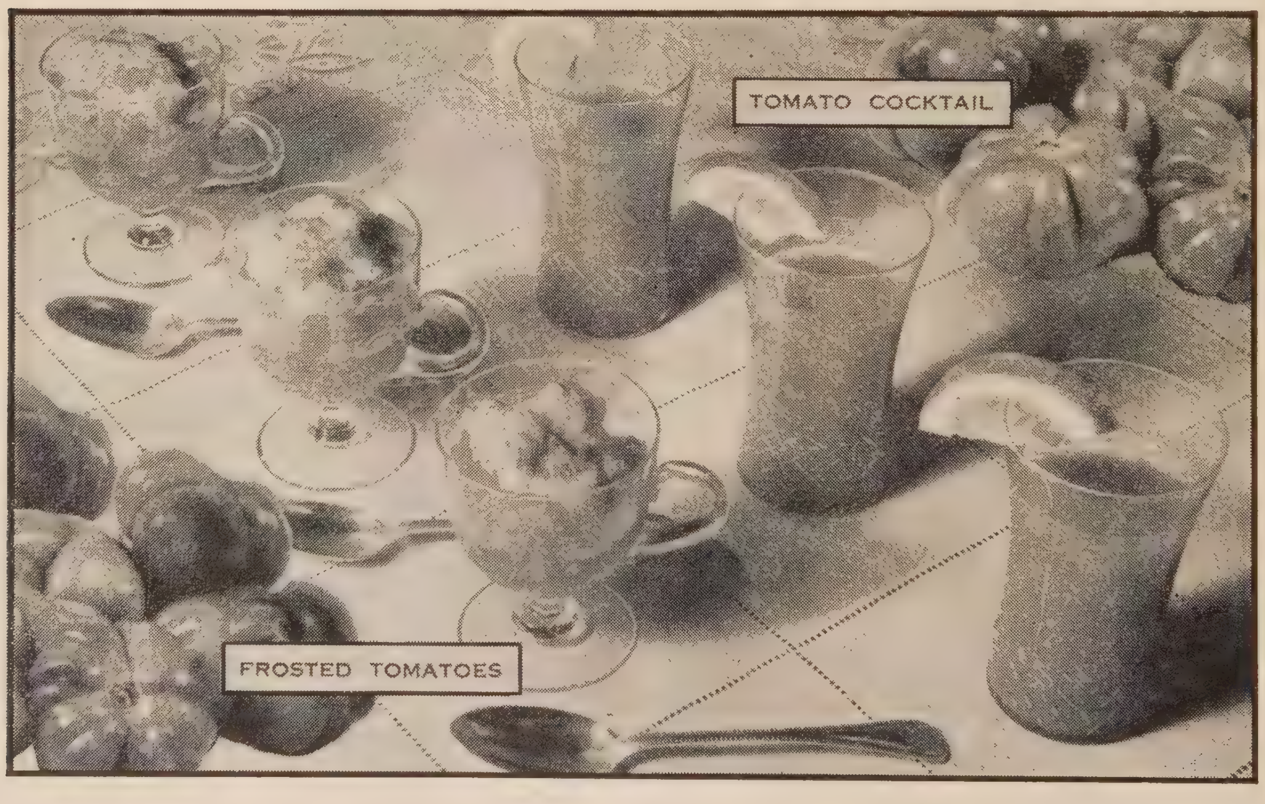
Tomato Relish (1)

4lb. of ripe tomatoes
1lb. of onions
1lb. of brown sugar
1 tablespoon of curry powder
6 chillies
2 tablespoons of salt
1 pint of vinegar
2 tablespoons of mustard
1 medium-sized green pepper
1 tablespoon of cornflour

Skin the tomatoes and cut them into small pieces. Peel the onions and cut them small. Remove the centre from the green pepper and shred it. Put the tomatoes, onions, green pepper shreds, salt, sugar, vinegar, and chillies (tied in muslin) into a saucepan and boil them gently for 1 hour. Mix the mustard, curry powder, and cornflour with a little cold vinegar and add it to the relish 10 minutes before it has finished cooking. Put the relish into small jars and seal them.

Tomato Relish (2)

3lb. of ripe tomatoes
1lb. of sugar
1½ tablespoons of mustard
Salt and pepper to taste
1lb. of onions
1 tablespoon of curry powder
2 tablespoons of flour
Vinegar



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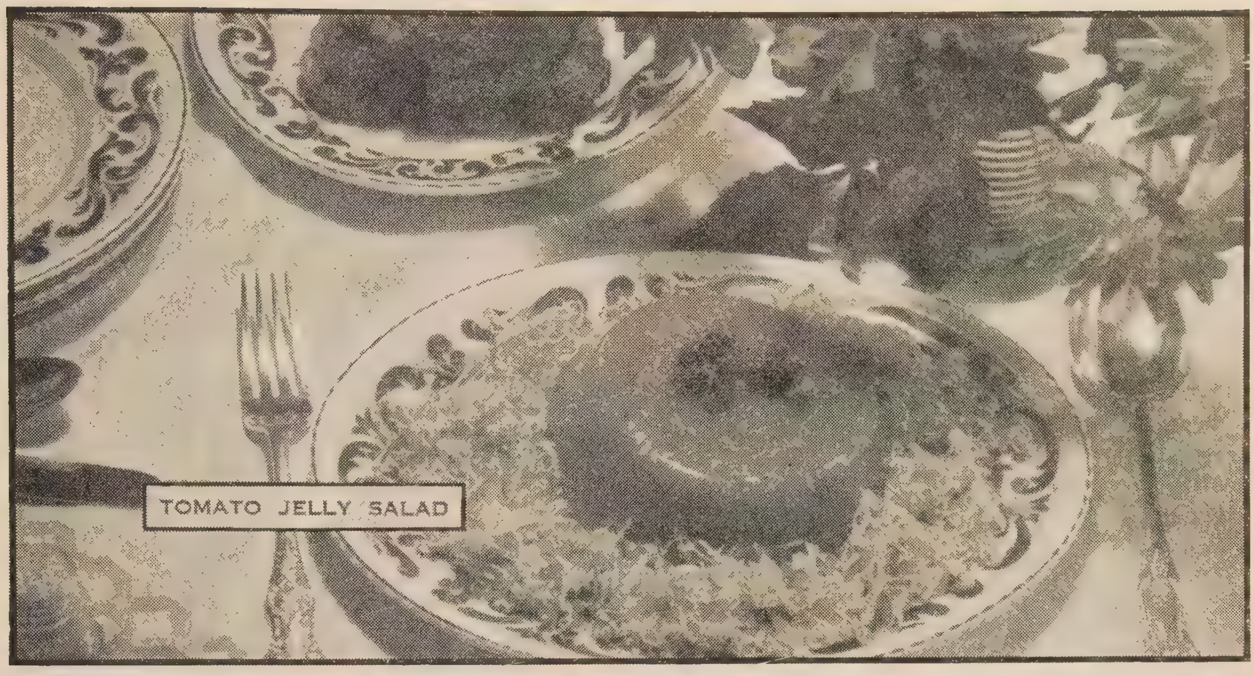
MAKING USE OF THE TOMATO CROP



TOMATO JELLY SALAD

[Sparrow Industrial Pictures Ltd. photo.

Scald and skin the tomatoes and slice them thickly into an earthenware bowl. Skin and slice the onions, add them to the tomatoes, and sprinkle the whole with salt (1 to 2 tablespoons according to taste). Cover the bowl and stand it aside overnight. Put the tomatoes and onions into a preserving pan and add the sugar and sufficient vinegar barely to cover them. Boil them gently for 1 hour. Mix the mustard, curry powder, and flour to a smooth paste with cold vinegar and stir them into the pulp. Boil it again for about ½ hour or until the mixture has the right consistency.

Spiced Vinegar: Many pickles are made with cold spiced vinegar, so it is a good plan to make up a quantity at the beginning of the season, as it improves with keeping. The spices may be varied to suit the taste, but these proportions suit most palates: To each quart of vinegar allow 1oz. (3 level tablespoons) of mixed pickling spices, or ¼oz. each of cloves, whole allspice, and cinnamon bark, some peppercorns, chillies, and a piece of whole ginger. Bring the spices and the vinegar to boiling point, cover the saucepan, and let it stand for 2 hours without further heating. Bottle the vinegar and strain it for use when required.

Ripe Tomato Sauce (1)

4lb. of ripe tomatoes
½oz. of salt
Pinch of cayenne pepper
¼ to ½lb. of sugar
½ pint of spiced vinegar

Wash the tomatoes, cut them up roughly turn them into a saucepan, and place them over a gentle heat until they become a soft pulp. Rub the pulp through a coarse strainer, add the sugar, salt, cayenne pepper, and vinegar, and boil it again, stirring continually until the sauce has a creamy consistency. Pour it into hot, sterilised bottles. Boil the corks for 10 minutes and put them in while both bottles and corks are still hot. When the sauce is quite cold, dip the corks and tops of the bottles into melted paraffin wax to seal them securely.

Ripe Tomato Sauce (2)

12lb. of ripe tomatoes
3lb. of brown sugar
3 flat tablespoons of salt
1½ pints of vinegar
1lb. of onions
3 flat tablespoons of mixed pickling spices

Wash the tomatoes, peel the onions, and cut both up coarsely. Put them into a saucepan with the vinegar, sugar, spices, and salt, and boil them for 2 to 3 hours. Rub the mixture through a colander, bottle it, and cork it securely as described in the previous recipe.

Tomato and Apple Chutney (without spices)

4lb. of peeled and cored apples
4lb. of tomatoes
1lb. of brown sugar
2 tablespoons of salt
2lb. of onions
¼lb. of garlic
1 teaspoon of cayenne pepper

Cut up the apples, tomatoes, and onions, put them into a pan, and pour over sufficient vinegar barely to cover them. Boil the chutney gently for 4 hours.

Tomato Chutney (with spices)

6 large tomatoes
3 cups of sugar
¼ cup of mixed pickling spices
1 green pepper
1 quart of vinegar
3 teaspoons of salt
1 cup of stoned raisins
4 small onions
6 apples

Chop the tomatoes, apples, green pepper, and onions. (The apples need only be cored; the skins may be left on.) Cut the raisins in halves. Tie the spices in a muslin bag. Put all the ingredients in a pan and boil them for 1½ hours. Pot the chutney in jam or jelly jars and seal the jars with melted wax and paper covers.

Green Tomato Chutney (1)

1lb. of onions
5lb. of green tomatoes
1 teaspoon of pickling spices
½ teaspoon of salt
1lb. of sugar
1 pint of vinegar

Mince or chop the onions and tomatoes. Cook the onion in a little water in a covered saucepan until it is soft. Add the tomatoes, salt, and spices (tied in muslin). Continue cooking until the ingredients are tender; it may be necessary to add a little of the vinegar during cooking to prevent burning. Then add the rest of the vinegar and sugar, stir well, and continue boiling the chutney gently until it has the consistency of jam and no vinegar separates when a little is cooled on a plate. Remove the bag of spice and pot the chutney into small, wide-mouthed jars.

Green Tomato Chutney (2)

4lb. of green tomatoes, sliced
1½lb. of onions, finely sliced
1lb. of brown sugar
1 teaspoon of cayenne pepper
3oz.of salt
1lb. of apples, cored and sliced
½lb. of raisins, sultanas, or dates
1 pint of vinegar
1 teaspoon of pickling spices

Boil all the ingredients except the vinegar and sugar gently for about 1½ hours, stirring occasionally. Dissolve the sugar in the vinegar and add it. Boil all the ingredients together for 15 minutes. Bottle and seal the chutney.

Tomato and Pear Chutney

1lb. of tomatoes
1lb. of pears
1 green pepper
1 onion
1 cup of sugar
⅛ teaspoon of cayenne pepper
¼ teaspoon of mustard
½ teaspoon of ground ginger
½ cup of vinegar

Chop the tomatoes, pears, and green pepper. Mix all the ingredients and boil them slowly for 1 hour, stirring occasionally. Pour the chutney into sterilised jars and cover them at once.

MAKING USE OF THE TOMATO CROP

TOMATO-CHEESE SALADS

[Sparrow Industrial Pictures Ltd. photo.

Tomato Pickles

Pickled Green Tomatoes

Choose small, even-sized tomatoes. Wash and dry them, and prick each 2 or 3 times with a needle to prevent the skin cracking. Pack them into clean pickle jars. Boil the required quantity of vinegar, adding to each pint 1 level dessertspoon each of salt and sugar. Cool it and pour it over the tomatoes. Add a few peppercorns, cloves, and 1 chilli to each jar. Put a small stick in the neck of each jar to keep the tomatoes down. Cover them with 2 or 3 thicknesses of grease-proof paper pasted on, and store the tomatoes in a cool place for 2 months before using them.

Green Tomato Piccalilli

6lb. of green tomatoes
2 quarts of vinegar
1 tablespoon of salt
2 tablespoons of mustard
5 large onions
1lb. of treacle or golden syrup
2 tablespoons of curry powder

Slice the tomatoes and onions. Boil all the ingredients together until they are soft, and thicken them with 4 tablespoons of flour or cornflour mixed with a little cold vinegar. Boil the pickle again for 5 minutes and put it into pickle jars.

Tomato Jams

Jams and preserves can also be made from tomatoes, the preserve being especially good. Tomato and quince jam makes a fair substitute for raspberry jam and is useful for cooking purposes.

Tomato Preserve

5lb. of ripe tomatoes
2 lemons
4lb. of sugar

Scald and peel the tomatoes, cut them into quarters, cover them with sugar, and stand them overnight. Slice the lemons very finely and soak them separately in only sufficient water to cover them. Drain the juice from the tomatoes and the water from the lemons, and boil the liquid rapidly until it spins a thread when dropped from a clean spoon. Add the fruits and boil them until the pieces are clear. Test the preserve for setting, pour it into sterilised jam jars, and cover them.

Tomato and Apple Cheese

2 cups of apple pulp
4 cups of tomato pulp
Juice of 1 lemon
4 cups of sugar

Cut the apples into chunks without peeling or coring them, and cook them in very little water (just sufficient to prevent burning) until they are soft. Cut the tomatoes and cook them separately without water. Press both through a sieve, add the sugar and lemon juice, and heat the mixture, stirring until the sugar is dissolved. Boil it rapidly until it is thick and clear. Pour it into sterilised jelly jars and cover them while the cheese is hot.

Tomato and Quince Jam

2lb. of quinces
3lb. of ripe tomatoes
1 lemon
5lb. of sugar

Peel and core the quinces and put them through a mincer. Skin the tomatoes and put them into a preserving pan with the quinces and sugar. Add the juice of the lemon and boil the jam until the setting stage is reached—about 2½ to 3 hours. Pour it into sterilised jars and cover them.

Green Tomato Jam

7lb. of green tomatoes
3oz. of whole ginger
1 lemon
7lb. of sugar

Wash and quarter the tomatoes, put them into a large earthenware bowl, grate the lemon rind over them, add the strained juice, and cover them with half the sugar. Stand these ingredients overnight, then pour them into a preserving pan with the ginger, bruised and tied in muslin. Bring them to the boil and simmer them for about ½ hour. Add the rest of the sugar, stir until it is dissolved, then boil the jam rapidly until a little tested on a cold plate will set. Take out the ginger and pour the jam into jars.

Tomato and Passion Fruit Jam

2lb. of ripe tomatoes
6 passion fruit
1lb. of peeled and cored apples

Skin and slice the tomatoes, add the chopped apples, and boil them together gently until they are soft. Add the sugar, stir until it is dissolved, and boil the mixture hard for about 30 minutes. Add the passion fruit pulp. and boil it again for about 5 minutes. Test the jam, and continue boiling, if necessary, until setting point is reached.

PLAY EQUIPMENT AND TOYS

EQUIPMENT and toys for the different kinds of play through which children build their bodies and personalities are discussed in detail in this article, the last of a series by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, which began last May. The surroundings and environment in which children play were dealt with in more general terms in the preceding article.

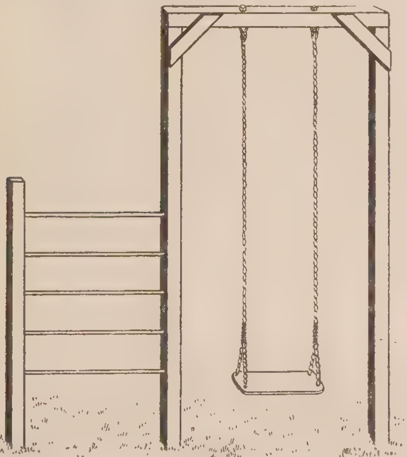
TO decide what equipment and toys are required for pre-school children it is necessary to inquire what purposes are served by toys in their lives. Dr. Agatha Bowley puts it this way: Pre-school children need toys to increase muscular development, for creative and constructive play, for imitative and dramatic play, and for sense training. Another psychologist gives 8 divisions: Toys for the infant before he can walk, toys for developing physical strength and skill, toys for constructive and creative play, toys for social development, toys for artistic development (arts and crafts), toys for stimulating knowledge and aiding in school work, toys for developing an interest in science, and hobbies and special interest.

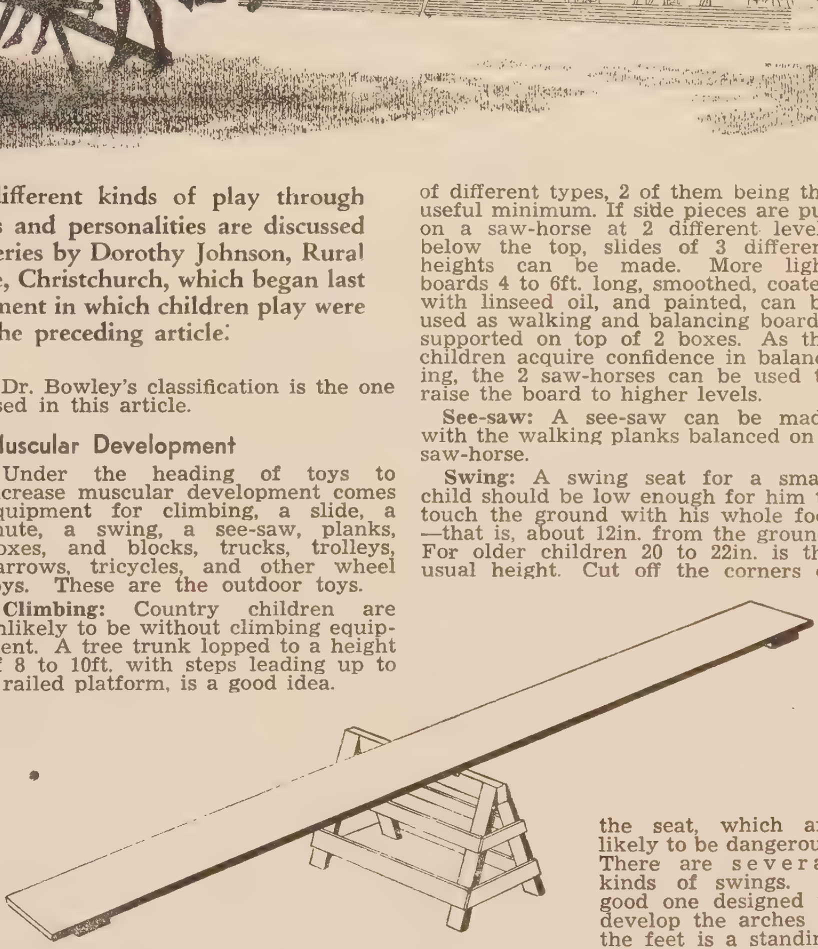
Dr. Bowley's classification is the one used in this article.

Muscular Development

Under the heading of toys to increase muscular development comes equipment for climbing, a slide, a chute, a swing, a see-saw, planks, boxes, and blocks, trucks, trolleys, barrows, tricycles, and other wheel toys. These are the outdoor toys.

Climbing: Country children are unlikely to be without climbing equipment. A tree trunk lopped to a height of 8 to 10ft. with steps leading up to a railed platform, is a good idea.





Slide: It is especially important that a board to be used as a slide should be free from splinters. It should be thoroughly sandpapered, coated with linseed oil, then shellac or varnish, and finished with a heavy coat of floor wax. So that children do not slide against the grain of the wood, put a cleat at only one end so that it cannot be placed in the wrong position. It can be used on different-sized boxes, of which the children should be provided with plenty, from closed ones 8in. x 5in. x 5in. to packing cases of varying sizes. Saw-horses are useful for slides of different types, 2 of them being the useful minimum. If side pieces are put on a saw-horse at 2 different levels below the top, slides of 3 different heights can be made. More light boards 4 to 6ft. long, smoothed, coated with linseed oil, and painted, can be used as walking and balancing boards, supported on top of 2 boxes. As the children acquire confidence in balancing, the 2 saw-horses can be used to raise the board to higher levels.

See-saw: A see-saw can be made with the walking planks balanced on a saw-horse.

Swing: A swing seat for a small child should be low enough for him to touch the ground with his whole foot —that is, about 12in. from the ground. For older children 20 to 22in. is the usual height. Cut off the corners of the seat, which are likely to be dangerous. There are several kinds of swings. A good one designed to develop the arches of the feet is a standing log swing made of a piece of log 21in. long and 5in. in diameter, with a balancing rod resting on knots in the rope about 27in. up. For strengthening arm and shoulder muscles a pair of flying rings can be made easily by slipping rubber hose or bicycle tyres over the ropes and fastening it tightly in a ring. These suit the smaller ones, but the older and more active children will need metal rings, as the hands will not slip on rubber easily enough for a comfortable change of grip. The motor-tyre swing is popular and can be used in many ways. The climbing rope is a

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heavy single rope in which knots are tied 9 to 14in. apart, the distance between knots depending on the size of the children who are to use the rope. Often climbing bars can be built at the side of a swing.

Care of Outdoor Toys

Wheeled toys figure largely in the play equipment of most families. If they do not include a truck or trolley, a box on wheels enables the children to go around the garden picking up toys and small objects at the end of the day. They need a "garage" for the cart in a small corner of a shed or veranda. This involves a routine delightfully like daddy's and, if all wheeled toys can be included in the routine, it will save many barked shins on the part of unwary adults and will contribute to a developing sense of orderliness.

To the list of toys for muscular development short ladders and small barrels can well be added. The ladders should be fitted with stout hooks at the top so that they can be hooked firmly in position. Once they are sure the ladder is secure, parents can safely leave children to play with it. A small barrel is splendid for pushing, pulling, and rolling by those under 6, and for the older children hoops are very good.

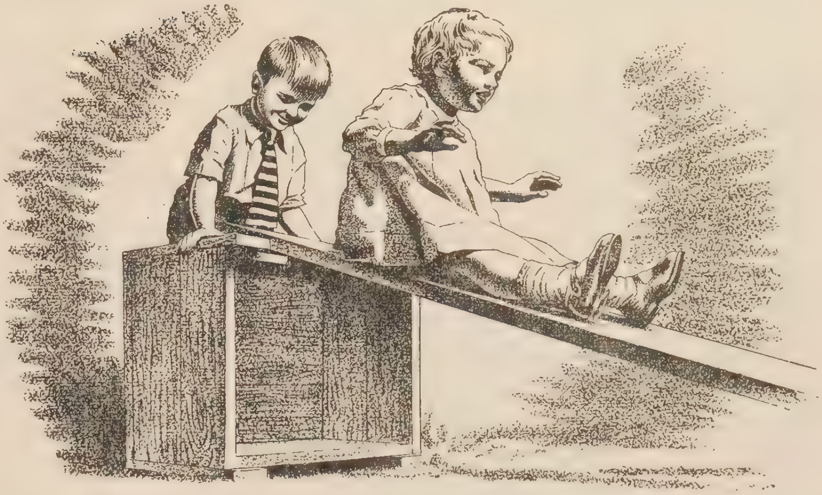
The list given is not the indispensable minimum for parents who wish to feel that they are providing the best for their children. They can exercise their prerogative of choice, picking out what suits their situation. In most families play equipment is built up gradually. A good beginning would be a sand box, packing cases, wooden boards, and small boxes. Instead of the boxes, groups of sawn-off logs of equal height—say some 6in., some 9in. —would suffice.

Creative and Constructive Play

Toys for creative and constructive play include bricks or blocks, large and small; packing cases and a piano case; paint and paper; plastic modelling material, clay, or dough; chalks and crayons; sand and water; and soap and wood with a hammer and nails.

Blocks should be either cubes or replicas of household bricks. They are expensive, as they must be made of the best wood, but they will last for years. One set made from samples of wood used in an engineering school for testing stresses and strains served 1 family of 5 children and now looks as though it will see another family through. Good blocks need to be kept indoors. Outdoors, hollow blocks like well-made boxes have many uses, especially for pushing, climbing, and building. Another idea when the winter wood supply is being cut is to cut a smooth log into even-sized rings so that they will fit on top of one another for building. At the same time a thick log can be cut for outdoor tables, each with 4 smaller logs for chairs.

Packing cases of different sizes which have been carefully checked for protruding nails so that the children can climb into them safely are material for playing house or shop or for other imaginative play. A box the size of a piano case with windows cut in the sides makes a good playhouse. A few smooth boards of different widths, lengths, and thicknesses, not too heavy for a little child to carry, have manifold uses.



Sand pit: A useful-sized sand pit is 4ft. x 6ft. About ½ cub. yd. (16 cub. ft.) of sand will fill it to a depth of 8in. It should have a cover to protect the sand from stray cats and dogs. The sand should be moistened occasionally, as cakes and pies, mountains and tunnels, all need moist sand. The children can take little stools or boxes to sit on. A sand pit of this size is large enough for 2 or 3 children, and it should be placed where it gets direct sunshine some time during the day.

Soap and wood, hammer and nails: Small children are quite capable of using tools. Banging large, flat-headed nails into a bar of soap is an absorbing occupation, and before many bars are used they will have learnt to hammer straight. The seeming waste of soap may sound shocking, but it is known from considerable experience that all of it can be used in the soap shaker in the kitchen sink. The children are then ready for hammering nails into soft pieces of wood, and surprisingly soon they can make toys for themselves.

Imitative and Dramatic Play

For imitative and dramatic play children need a playhouse, a doll's house, or both; dolls and dolls' accessories; teasets and domestic articles; trains, cars, aeroplanes, and the like; and a box of odds and ends and dressing-up materials.

Sense Training

Toys required for sense training include peg boards, fitting toys (for example, a posting box), puzzles (for example, jig-saws and picture blocks), colour-matching games, and games developing the sense of touch.

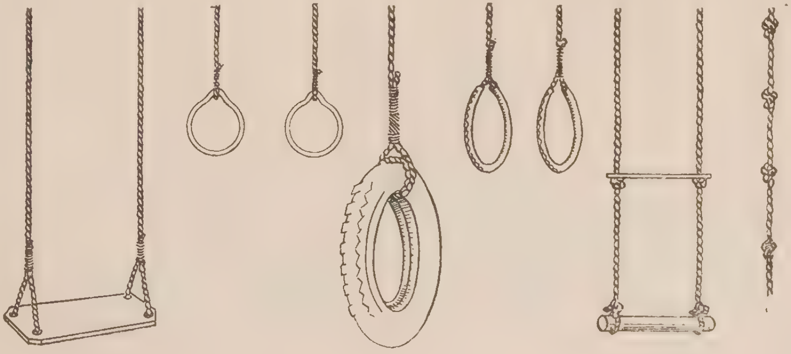
Availability of Toys

The toys children use for working out their constructive ideas, like blocks, boxes, trains, and push and pull toys, should be readily available always. Each should have its proper storage place.

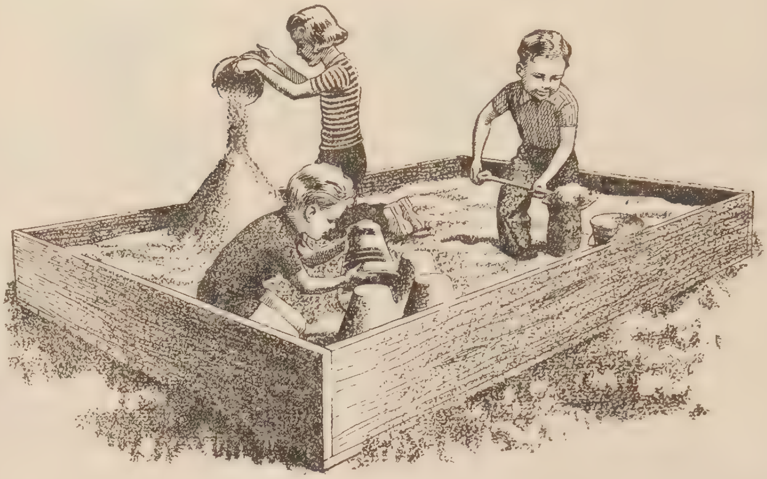
Some toys, especially those with which it is advisable that an adult should be present when the children are playing with them, should be reserved for special occasions. They can be put right away when children go for their rest at midday or to sleep at night. Examples of these toys are those under the heading of sense training.

When children have outgrown certain toys, parents should not dispose of them or give them away without their knowledge, or the children may lose confidence in their parents. It is not possible to gauge the amount of affection children may have for particular toys. Should a child ask for a discarded toy, it should be shown to him at once. A discard box will prevent the toy cupboard from becoming cluttered.

All kinds of oddments can be placed in a scrap box—paper of various



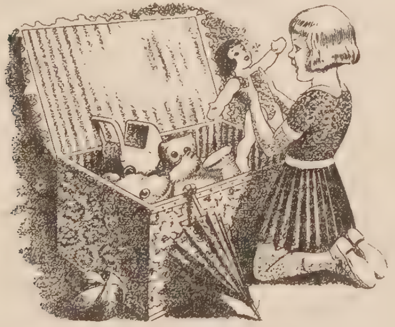
PLAY EQUIPMENT AND TOYS



shades and textures, matchboxes, buttons, reels, string, raffia, wool, scraps of dress materials, rubber bands, beads, pieces of wood, cardboard, corks, boxes of all shapes and sizes. Sooner or later some use will be found for all this material, which can be produced when the children are making things or producing plays.

In a discard box put toys momentarily out of favour. They will be welcomed with delight when they are brought out again. Toys which need repairing and painting can also be consigned to this box. Too many toys at once are a hindrance and spoil the children's power of concentration, their energy becoming dissipated and confused.

In a dressing-up box keep old clothes to be brought out on wet days. They are a priceless boon, for children never tire of play acting and masquerading as grown-ups. A variation of this is to keep a few particularly-charming garments of children at various ages. When they are grown up and have small sons and daughters of their own, these clothes will be of never-failing interest—"the frock mummy wore when she was my age." They will be a bond between grandparent and grandchildren.



Interference by Adults

A commentary by Miss Lois Benjamin on the value of toys in the very early life of children is worth the attention of parents: "Toys have a great value beyond the satisfying of the child's momentary need for amusement. They help to free the child from his dependence upon his mother. Unless he has toys, his mother is the only permanently-interesting object in his environment, if it were for no other reason than that she were his food supply. And this is unhealthy, as it means that he will cling to her wherever she goes . . . and he will be prevented later from making normal contacts with children of his own age."

So, having provided the play space, playthings, and playmates, it is well to leave children with the minimum of adult interference.

Country mothers usually are far too busy to make the mistake of interfering too much, so their children become independent and resourceful. They may not be worried overmuch by the cry of "Mum, what can I do?" and "What can I play next?" especially if they plan playing space and playthings carefully.

However, children, through their lack of experience, do come to the end of their ideas and need suggestions. An adult should then give them an idea and probably materials, start them off, and leave them to carry it out in their own way unless definitely asked to join in, in which case her role is that of the rank and file—the follower in the game; her adulthood must be forgotten or put aside.

Parent-child Relationships

In one kind of play children are exploring the world of things, manipulating them and gaining the knowledge which develops their individual skill; the major part of this article and the preceding one has been about that aspect of their play life, dealing with the parents' role in planning the environment so that these skills can be gained. In the other aspect of play, children are exploring the world of persons, developing the attitudes toward other people on which their present and future success and happiness depend. The parents are first in this field, and their relationships with their children set the outline of the pattern of the future. As parents can have deep faith in the constructive essence of their children's growth, they can enjoy them while they are theirs. The matter can be put in the form of direct questions: "Do you enjoy your children? How much fun do you have with them? Are they so much work that you don't have time to enjoy them?"

For their own full development parents need to enter whole-heartedly into the enjoyment of their children at every stage through all the years of growth. Some parents are always rushing through the present with their eyes on the future, full of busy eagerness to get the next stage in their child's development, whether it be walking or talking, independent feeding, or going to school. The joys of the present are experienced only faintly, and the wonder of the developing life is lost to them. Psychologists say that it is such people who sentimentally keep mementoes of their children's early years, such as clothes or toys, as their minds stay regretfully fixed on a stage the essential joys of which they were unaware of at the time and did not experience. That seems a sweeping statement, for there is surely some place for the treasuring of a specially-loved toy, but it contains a warning. Children more completely belong to their parents in their earlier years than at any other time, and the image of those earlier years often hovers behind the competent adult daughters and sons in their parents' eyes—who would have it otherwise? The grown man and woman belong to themselves and the future.

Either way, making time for play and building into the memory real treasures for both generations undoubtedly is worth while. Short cuts can be taken with the house and other work, and even with the chores of baby tending. If the silver grows dull because of lack of polishing, comfort can be had from the fact that it will last longer. Parents can remind themselves that when the children are grown up all the household tasks will still be there waiting, but the children will not.

This suggestion does not mean that children can be treated as special little wind-up toys that perform for the benefit and pride of their parents and their friends. Fortunately, parents' love and pride in their offspring do help in keeping the right balance. Children on their side need the significance and security which parental love gives them when expressed in affection and play—the feeling that they are worth while or desirable playmates in their parents' eyes.

Social development can come only by experience, by that continual game of give and take between people of all ages, in an atmosphere which must not be too exacting or too serious. It must be one where no one expects too much of the others and all is pervaded by the saving grace of humour.

Discussion Courses

Some of the discussion courses of the university colleges' adult education departments mentioned in earlier articles have been withdrawn and newer ones substituted. Therefore when applying to these departments it is advisable to ask what discussion courses on child care or child psychology are available. Last year Canterbury College issued a course called "From Home to School" in attractive printed leaflets.

Acknowledgments

Bulletin 238, United States Department of Labour, "Home Play and Play Equipment for the Pre-School Child"; Ethel Kawin, University of Chicago, "The Wise Choice of Toys"; Dr. Agatha Bowley; Dr. Arnold Gesell; H. M. Heaton, "Home Training for Young Children."

THE MUSEUMS OF NEW ZEALAND

PREVIOUS articles in this series by Enid B. V. Phillips have dealt with the four metropolitan museums in New Zealand—the Dominion, Otago, Canterbury, and Auckland War Memorial Museums. In this article she describes three provincial museums, the Mission House at Tauranga and the Southland and Hawkes Bay Museums.

The Mission House, Tauranga

THROUGH the preservation of the Mission House, Tauranga, present-day sightseers have been given the means of visualising some of the pioneering history of the Bay of Plenty district. This lovely old house with its twin dormers and graceful frontage of French windows shuttered in timber after the fashion of venetian blinds is notable because it has been occupied continuously by one family for over 100 years, Miss Alice Maxwell, niece-in-law of the builder-owner, Archdeacon Brown, being in residence there until her death several months ago.

Alfred Nesbit Brown came out to Paihia, opposite the prosperous whaling port of Kororareka, now called Russell, in the year 1829 to join the band of missionaries in the Bay of Islands and to undertake evangelical work under the guidance of the brothers Henry and William Williams, and he brought his English bride with him. When the mission decided in 1834 to extend its activities southward the Rev. Brown and his great friend the Rev. William Williams were chosen to select suitable sites for mission stations. They adhered to their choice of Tauranga, or Te Papa as the Maoris used to call it, despite the principal chief's attempt to persuade them to set up their headquarters at Te Tumu, some 70 miles further down the southern coast.

Brown was first stationed at Matamata and, though during 1836-37 he and other workers took turns of duty at Tauranga, the times were too troublous to permit their families to accompany them. Matters improved by the next year and the Browns were reunited and took up their residence at Tauranga in a small rush hut lacking even such amenities as a chimney or a lining to the roof when they moved in. (The lime for the mortar was obtained by burning shells which first had to be gathered from the Mount and carried across the harbour by canoe.)

Herculean Task

A store in which to keep the mission goods was the next requirement and as soon as this was completed a start was made with the house. And what a Herculean task it proved to be. Every piece of timber had to be hewn from the bush at Mercury Bay or the Thames district and the huge kauri trunks conveyed down the coast in rafts to the beach at Waikareao and then hauled bodily up the hillside to the house site; the great logs were then hand-sawn into the required lengths.

The overwhelming nature of the disaster when fire destroyed not only all the joinery in the workshop but the entire stock of seasoned timber and the carpenters' tools as well can well be imagined. The whole arduous process of tree felling and seasoning had to begin all over again and new tools and supplies had to be ordered from England, it being at least 12 to 18 months before they could arrive. The value which was placed on such items may be gauged from the fact that during the waiting period Brown dispatched a special letter to a fellow-worker at another mission station requesting the loan of 3 nails so that he could finish an important job. However, the library, which was quite separate from the house and fully completed at the time of the fire, afforded a welcome dwelling-space throughout the next 2 years until the timber losses could be replaced and the house finished.

Secret Cavity in Library

One feature of the library which never fails to appeal to youthful visitors is the secret cavity under the floor which can be reached only by a trap-door, a procedure wholly in accordance with the most exciting adventure stories. This extensive "cellar" and the hollow space between the ceiling and the roof served as a hiding place for the Browns' valuables whenever there were threats of uprisings among the Natives.

[*National Publicity Studios photo.*

The Mission House, Tauranga, now more than 100 years old.

The mahogany chairs, the first set with a carver's chair ever to come into New Zealand, and the matching table were brought out by the newly married couple. The piano, too, rather like an old-fashioned harpsichord and one of the earliest models manufactured in England by William Allen, was the first in this country, and an Aeolian harp from whose strings every passing breeze plucked plaintive melodies is another quaint instrument the Browns brought to New Zealand. The room is full of the archdeacon's personal possessions such as his pocket compass (a necessity on his hazardous journeys to the more distant parts of the province under his jurisdiction), his portfolio and two pairs of candle-snuffers and trays, his blotter and ebony ruler, and the Bible which he used for family prayers. The bronze inkstand and candlestick and the box for sealing wax were given to him by Bishop Selwyn before leaving England; the bishop was later a regular and frequent visitor to the "Archdeaconry" as the Mission House was then termed.

Most of the books in the archdeacon's library are beautifully bound in "hand-tooled calf or Persian leather" and his copy of Selwyn's "Journey Through New Zealand" bears the bishop's autograph. There is a copy, too, of the first book printed in the Maori tongue in this country, the Gospel of St. Luke; it was published by the mission press at Paihia in 1835. Among the files of early newspapers are several numbers of "The New Zealand Advertiser and Bay of Islands Gazette" for 1840, a weekly publication in Russell, where the Government was then situated. One issue gave sailing instructions for entering the Auckland harbour, which had just been proclaimed an official port. There is also the first edition of "The New Zealander," dated Saturday, June 7th, 1845, which contains a report of the burning of Russell by Hone Heke and his warriors.

Cleverly Built Dining Table

The Browns were noted for their hospitality, and all manner of guests from bishops and members of the Bench to travelling bushmen gathered round the great mahogany table in the dining-room. This table was cleverly constructed to fold up, legs and all, into its frame so that it could be carried flat on a man's back, for in those days in the absence of horses or oxen the settlers themselves had to become "beasts of burden" when it was necessary to transport goods over rough bush tracks and rugged

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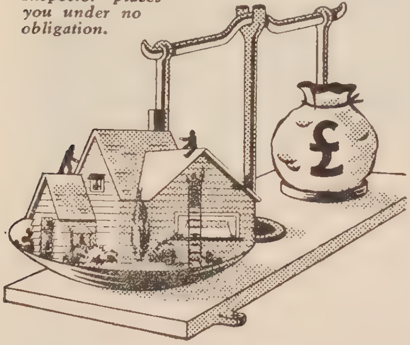

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WHEN the golden grain is harvested and townspeople love to join in the work in holiday spirit to help their country folk and regain their health. Co-operation is the keynote and both town and country people find they are mutually well supplied with banking service throughout the 107 branches and agencies.

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mountains. By an ingenious arrangement of additional leaves and legs the table could be extended to a length of 8½ft., and on one memorable occasion when even this proved insufficient to accommodate all the guests a side buffet was set up to seat the overflow.

Alas! of all those present on that particular evening, April 28, 1864, only one was spared from violent death the next day. For this was the eve of the attack on Gate Pa and with the exception of the army surgeon, Dr. Manley, every officer of Colonel Carey's forces, as well as several from the warships in the port, who sat at that festive board and afterward partook of Holy Communion together died in battle. On the morrow the house, which but a few short hours before had resounded with gaiety and good fellowship, was now heavy with the anguish of the wounded. The death roll was so high that it was days before enough coffins could be made to enable the archdeacon to conduct the burial service, the bodies meanwhile being protected by tents in the graveyard.

Indian Antiques

Archdeacon Brown was a man of very small stature (so much so that he had to use a high wooden stool instead of a chair if he did not wish to disappear out of sight of his congregation when he sat down in his pulpit), but his countenance is eloquent of his nobility of character, as is shown in the miniature framed in ebony and silver and painted by a Delhi artist from a photograph. His paua shell and papier mache chess board was also fashioned in Delhi, and sharing pride of place in the drawing-room with a beautiful Waterford crystal bowl made in Ireland a century or more ago is a diaphanous shawl of Indian silk whose exquisite embroideries are over 300 years old. Another valuable antique from the East is an escritoire of Indian teak.

Water-colour sketches of Tauranga in the early days include one of the British battleships and Maori war canoes lying offshore during the Gate Pa engagement. The wakahuia (box for holding huia feathers) presented to the archdeacon by a paramount chief is a magnificent specimen, and one of the pois hanging beside it is interwoven with raw doghide, a custom which, because it pertained only to very early times, makes this poi a rarity. A singularly lovely greenstone eardrop was also a gift, and was given to the archdeacon's wife by a grateful Maori woman in appreciation for Mrs. Brown's having tended her injured son after fire broke out in the sanatorium near the Rotorua boarding house where Mrs. Brown was staying at the time. The owner of the trinket first journeyed on foot to obtain it from her own tribesfolk and then walked all the way from Rotorua to Tauranga to bestow it on Mrs. Brown.

This is by no means an exhaustive list of the contents of "The Elms," as the old Mission House is now known. Other items of interest include a palatial, canopied four-poster bed, a chest of drawers, and a table which came from Australia and which were all made from the one cedar tree; the dining-room tablecloth, handwoven from linen flax in 1829 and in constant use ever since, its only sign of wear being a minute hole burned by a sudden spark from the fireplace; and fine china and ornaments.

Southland Museum

Like Auckland, Southland has a memorial museum, but the modern, many-windowed structure of rose-red bricks set amid the green verges and jewel-bright flower beds in Victoria Avenue, Invercargill, with the leafy tracery of trees in Queen's Park forming a backdrop of magical beauty, is a provincial memorial to the centennial of New Zealand.

Although the desirability of having a separate building for a museum had long been mooted among the more civic minded citizens of Invercargill it was really Mayor John Miller who in 1936 took the practical step of calling a public meeting and formally proposing the project. The idea was adopted, but had to be modified somewhat owing to the increasing building costs and other difficulties caused by the war.

The mayor did not live to attend the official opening, and Sir Robert Anderson, whose generous donation to the building fund helped to save the situation when finances were at a low ebb, was not present either at the ceremony, which took place just before his death in 1942. But their names will not be forgotten by the residents of Southland, for the two galleries, which, together with the lecture room, comprise the first floor of the museum have been called after them. Another equally liberal donor was Miss E. W. Bellamy.

Collection in Barber's Shop

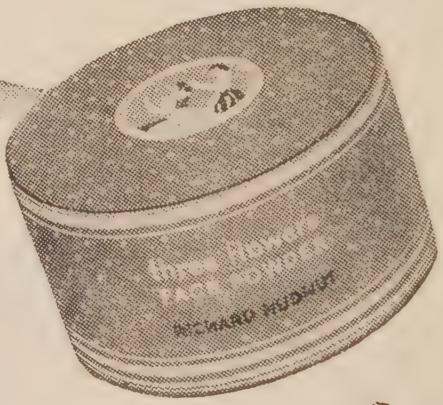
The first museum in Southland was a private one and belonged to a barber by the name of Andrew McKenzie. Presumably he did not regale his customers with gossip or the latest racing tips, but chatted entertainingly of natural history and kindred topics while his skilful scissors kept up a rapid staccato accompaniment. Thus, for about the price of a haircut Invercargill citizens of the 1870's could satisfy their curiosity as to the truth of his tales and gaze at all manner of singular objects as well. Many people considered the whale's jaws, 18ft. long, the piece de resistance of the whole display, and this exhibit and many others from McKenzie's museum can still be seen in the Southland Centennial Museum today.

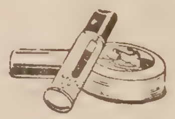
Just how profitable McKenzie's enterprise proved history does not relate, but his collection was eventually housed along with the library of the Southland branch of the New Zealand Institute (now the Royal Society) in the Invercargill Athenaeum, where the institute branch held its meetings. Sundry additions to the original collection were made by different donors from time to time, so that New Zealand's southernmost province really had a public museum by 1890. The Southland Museum Board, however, did not come into being until May 16, 1915, most of its members consisting of representatives of contributing bodies.

Under the able leadership of the chairman, J. Crosbie Smith, partner in an ironmongery firm and a keen student of botany, natural history, and ethnology, the board was able to secure the addition of a gallery for display purposes in the new assembly hall of the Southland Technical College, which was then in the course of construction about ½ mile from the centre of the city. An education board building at the back of the school did duty as a store and workshop, the museum board chairman, Robert Gibb, and Alfred Philpott being honorary curators. (Mr. Gibb was for some years agricultural instructor to the Southland Education Board and shared the same scientific pursuits as Mr. Smith. His private collections were bequeathed to the museum for which

[Campbell's Studio photo.

The front entrance of the Southland Museum, Invercargill.





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he did so much in its earlier days. Alfred Philpott has been described as one of Southland's most distinguished sons and played an important part in the development of New Zealand milk products, retiring from business while comparatively young and devoting the rest of his life to the study of entomology and particularly lepidoptera. Some of his type species of moths and butterflies are now in the museum. At one stage he joined the staff of the Cawthron Institute, but soon resigned his position in order to continue with independent research, for which special facilities were accorded him. The closing years of his life were spent in Auckland, where he was actively engaged in research in association with the Auckland Museum.)

[R. W. Orr photo.

The central portion of Hawkes Bay Museum and Art Gallery, the building of which was completed in 1937.

Creditable Achievements

When Mr. Smith went to Dunedin to live in 1923, George Frederick Jaquiery became honorary curator and from then until his death in September, 1937, he carried on the work of the museum practically single-handed with only the minimum of funds and assistance. His achievements in this regard were all the more creditable because of his many other public duties. In addition to his responsibilities as a manager of a business firm, he taught three evenings a week at the Southland Technical College and at the time of his death he held the record for the longest teaching service in the history of the college. An obituary notice in "The Southland Times" read: "In knowledge of the natural history of Southland he had no equal. He had explored its back country, studied its geology, botany, and biology with very acute powers of observation and a very retentive memory. He knew the occurrence of its plants, minerals, animals and birds as no one else has done. This information was always willingly imparted to all. . . ." He was an honorary fellow of and examiner for the Royal New Zealand Institute of Horticulture.

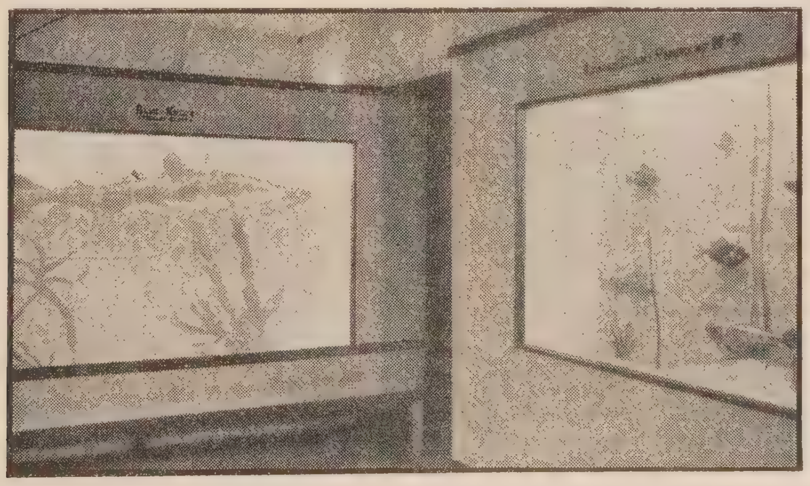
His successor, J. H. Sorenson, was responsible for the excellent arrangement of the collections in the new building, and George Jaquiery, his son, is a member of the honorary staff which assists the present director, David Teviotdale.

The long room at the left of the stairs provides the visitor with a far more vivid picture of the pioneers of the province than the perusal of a dozen history books, especially if the tour is made in the company of Mr. Teviotdale. For instance, the mahogany medicine chest with ivory pill boxes, glass mortar and pestle, and double tier of quaint-stoppered, square-cut bottles in individual compartments was used by the commander of the Eliza, Captain John Howell, whose establishment of a whaling station at Jacob's River in 1836 led to the founding of Riverton.

Work in Silk and Lace

Another relic with a nautical flavour is a picture of the sailing ship Dunedin, the first vessel to carry frozen meat from New Zealand to England, worked in brightly coloured silks on tapestry canvas by a Dunedin housewife of the day. A handworked lace collar and fichu the colour of old ivory are just as lovely as when they were first completed by their maker, a maiden lady who resided at Winton about 60 years ago. There are Chinese curios and toys brought back for his family by a seafaring captain who later relinquished his command to settle on shore and become one of the first stationmasters at Bluff. A tobacco pouch fashioned by a sailor from the foot of an albatross, the soft, pearl-tinted skin between the claws being as delicately grained as the finest leather, reposes next to a pair of white kid gloves in an incredibly small fitting and correspondingly diminutive white kid shoes with elastic sides and exceedingly pointed toes that were worn by an early Southland bride at her wedding.

A domestic scene at the Davidson residence in Port William, Stewart Island, has been painted for posterity by the artist Moreton, who visited the port in 1872. His water-colour portrays in delightful detail the thatched, white-walled homestead with its picket fence and curling smoke plume drifting from the chimney against a background of sombre bush and brilliant skies. A whaleboat is drawn up on the beach, where a small blue-clad child gathers driftwood for the fire while her father cleans the fish he has caught, and close at hand the mistress of the house sits contemplating these activities and enjoying a few moments unwonted leisure in the sunshine before bustling indoors to begin preparations for the midday meal.



The modern display arrangement of exhibits in the Hawkes Bay Museum is modelled on the methods used by leading American museums.

Hawkes Bay Museum

There has been a museum in Napier since very early days, its establishment being the particular project of the Hawkes Bay Philosophical Society (now the Royal Society), which later presented the collections to the Napier Borough Council. The museum had as its first curators the president and secretary of the Philosophical Society, namely, the schoolteacher Augustus

THE MUSEUMS OF NEW ZEALAND . . .

Hamilton, who in 1903 succeeded Sir James Hector as Director of the Dominion Museum and who published numerous scientific papers, and William Colenso, also a man of many callings, having come out to New Zealand in 1834 as a catechist and printer for the Church Missionary Society. The Epistles to the Ephesians and Philippians, the first book to be printed in New Zealand, was a product of his press, and he afterward completed the whole New Testament, publishing 6000 copies in small pica type. He was responsible, too, for the greater part of the printing of the Treaty of Waitangi.

He engaged in missionary work for many years and as a leading authority on Maori lore and natural history (ferns and fossils were his special forte) he shared with Sir George Grey the honour of founding the New Zealand Society for the Furtherance of Scientific Research. Moreover, he was inspector of schools throughout Hawkes Bay Province for a lengthy period and proved as competent at compiling a Maori-English lexicon as writing a treatise on ancient tide-lore or the remains of the moa. Thus, the museum at Napier, though a small one, had a singularly favourable start.

Generous Offer by Lady McLean

When the disastrous earthquake of 1931 ravaged the district and destroyed most of Napier the museum building and collections did not escape unscathed, and it was the generous offer of Lady McLean (daughter-in-law of Sir Donald McLean, Superintendent of the province in the 1860's, a post from which he resigned only to render even more meritorious service as Minister of Native Affairs) to donate her extensive collection of Maori and historical objects to the local art society (of which her late husband, Sir Douglas McLean, was the first president) in trust for the town of Napier which led to plans being drawn up for the erection of a combined art gallery and museum to house the McLean collection and the exhibits salvaged after the earthquake. It says much for the public spirit of Napier's citizens that, preoccupied as they were with rebuilding their homes and businesses, a proceeding made infinitely more burdensome by the problems engendered by a world-wide economic depression, they subscribed so liberally to the scheme.

This was largely due to the zeal of L. D. Bestall, a businessman and prime mover in the plan, who by his personal efforts raised the first £500 of the sum needed. The foundation stone of the new art gallery was laid by the Governor-General on July 18, 1935, and the first portion was completed in January of the following year, when the museum material, headed by the McLean collection, with its distinctive drawings of Maori life and moko (tattooing) made by Lieutenant (later Major-General) Robley during the Maori War—96 sketches in all—merged with the reproductions of famous works of art newly arrived from London. An opportune grant from the Carnegie Museums Trust, however, enabled a further portion of the building to be proceeded with and it is this central sector, of plastered concrete and brick-panel construction, which is now the permanent abode of the museum.

Many of the stands and showcases have been made by that energetic band of workers who have so ably supported Mr. Bestall in the work he has done as honorary director. Indeed, "Monday night is museum night" might well have been the motto of these enthusiasts until the war intervened, and even now a small group still meets at the museum each month to give the staff any assistance which may be needed. The late W. G. Ball, in his capacity as honorary curator, was particularly helpful in the identifying and cataloguing of specimens. (Like Colenso, he was a printer, and his ethnological knowledge was considerable.) He also devoted much of his time to acquainting classes of schoolchildren with the museum and giving them lecturettes, an immensely worthwhile effort which, since his death in 1942, has been continued as far as possible by various members of the staff, both permanent and voluntary, including Miss A. M. Andersen, a retired schoolteacher, who has carried out the duties of librarian in addition to developing the educational work of the art gallery and introducing several novel ideas which have not been tried elsewhere.

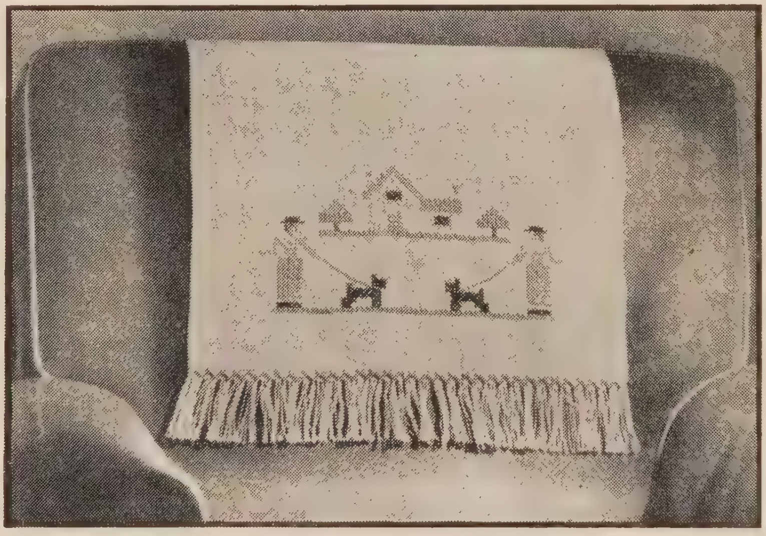
Recent Acquisitions

There has been much rejoicing over the museum's most recent acquisitions—the coach which carried passengers on the Napier-Taupo trip in the old days; the Collin collection of minerals; the Oldham collection of carvings etc., from Papua; the Waipare Maori collection; the Russell Duncan bequest of a valuable reference library about New Zealand and exploration in the South Seas and Antarctic; and a selection of original wood engravings from the noted Irish artist-author Robert Gibbings, who during his stay in Napier in 1947, produced the museum's bulletin "Kiwis in Captivity," based on the observations of F. D. Robson, curator of the acclimatisation society. Mention must be made, also, of the up-to-date display methods adopted by the museum (the modern colour scheme of warm-hued walls and decorative blue floor in the Maori Room, for instance, sets off the exhibits to perfection), the honorary director having made a special study of the subject while on a visit to the United States of America.

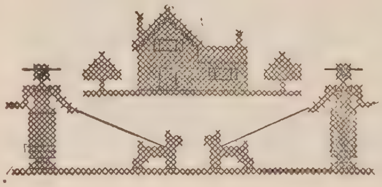
Truly, this handsome edifice near the Marine Parade Gardens, with its pleasingly designed facade and proud legend, "Hawke's Bay Museum and Art Gallery" lettered in bronze above the doorway, is an impressive example of what can be achieved by a community which gives cultural activities their rightful place in the everyday pattern of living.

◆

Chair Cover in Cross-stitch



A STRIP of linen about 13in. by 20in. can be made into a colourful chair-back cover. Hem the sides and fringe the back end for about ½in. Work whipped herringbone stitch in two colours about 1½in. above what will be the front edge, then fringe up to it. Use as many gay odds and ends of thread as possible for the quaint cross-stitch motifs, keeping all top stitches going the same way. Each cross measures ⅛in. and the design at the widest part measures 10in.



Fruit Drinks

By NELL MACPHERSON,
Rural Sociologist,
Department of Agriculture, Auckland.

FRUIT DRINKS are refreshing and pleasant in summer, but their use is not limited to hot weather. Extracts of seasonal fruits or those which are abundant can be prepared and stored for use in winter or at parties, particularly children's parties. They are also very acceptable at picnics and tennis parties or during particularly busy periods on the farm, such as at shearing or haymaking time. Most fruit drinks are easy to prepare and make a pleasant addition to the school lunch, and they also provide some minerals. Hot or iced fruit drinks are often welcome in the sick room.

FRUIT DRINKS may be divided into several basic types —syrups, squashes, teas, and punches.

Syrups

A syrup is a sweetened juice extract. It may be prepared as in the basic recipe and then added to the juice, or sugar may be added to the diluted juice, a variation of which method is given in the 4 recipes which follow. The addition of lemon juice improves the flavour of every other fruit juice, as it sharpens it.

A basic syrup may be made by boiling equal quantities of sugar and water for 20 minutes. It should be poured into clean, hot bottles and sealed. This syrup may then be added to any fruit juice to make a fruit syrup. The proportions usually used are 1 cup of syrup to 2 cups of juice.

Lemon Syrup

2 large lemons	1oz. of citric acid
3lb. of white sugar	

Peel the lemon rind thinly, place it in a saucepan with 3 pints of water, bring it to the boil, and boil it for 15 minutes. Add the lemon juice, cover the saucepan, and boil it for 15 minutes. Strain the liquid, return it to the saucepan, and add the sugar and acid. Boil the syrup for 5 minutes and allow it to cool before bottling it. When it is to be served dilute it to taste with water.

Berry Syrup

2lb. of ripe berries	1oz. of citric acid
1¾lb. of sugar	

Mix the acid in 1½ cups of water, pour it over the fruit, and let the mixture stand for 24 hours. Strain it, add the sugar to the juice, and just bring the syrup to the boil before cooling and bottling it. Add water and sugar to taste when serving the syrup.

This recipe is suitable for blackberries, boysenberries, raspberries, loganberries, and strawberries.

Ruby Syrup

1 pint of raspberries	1 quart of ripe currants
½lb. of granulated sugar	

Bruise the fruit in a preserving pan with a potato masher and add the sugar and 2 quarts of cold water. Heat them without boiling until the sugar is dissolved, then bring them slowly to the boil. Strain the syrup and allow it to cool.

Sugar and water can be added to taste, and this drink is improved by adding ice when serving it.

Passion Fruit Syrup

2 dozen passion fruit	3 teaspoons of tartaric acid
3 cups of sugar	

Make a syrup of the sugar and 3 cups of water. Scoop the passion fruit pulp into a jar, add the acid, and pour the syrup over it. Cool, strain, and bottle the syrup. Add water to taste when serving it.

Squashes

The major difference between a squash and a syrup is that a squash usually is not diluted before being served. Squashes may be either effervescent or still. A quarter teaspoon of baking soda to a glass of squash causes effervescence.

Lemon Squash

A basic lemon squash is made by adding 1lb. of castor sugar to 1 pint of strained lemon juice and stirring until the sugar is dissolved. Before being served this is diluted in the proportion of 1 part of lemon squash to 5 parts of water. This base can be kept for some time in sterilised bottles sealed with wax.

Variations of lemon squash can be made by adding 2 tablespoons of any crushed fruit to a tumbler of the diluted squash. Raspberries, pineapple, loganberries, and peaches are all pleasant additions.

Orange or Grapefruit Squash

Juice of 4 oranges or grapefruit	Juice of ½ lemon
4 tablespoons of sugar	

Dissolve the sugar in a saucepan containing just enough boiling water to cover it. Add the strained lemon juice and orange or grapefruit juice and then 4 cups of cold water. Serve this squash quite cold. Part of the orange or grapefruit juice can be replaced with other juices—for example, black currant, raspberry, or loganberry.

Heading photograph by Sparrow Industrial Pictures Ltd.

RECIPES FOR FRUIT DRINKS . . .

Teas

Another variation of a fruit drink is the infusion or "tea." In these drinks boiling water is poured over the fruit, which is then steeped until the flavour is extracted. These can be drunk either hot or cold.

Black Currant Tea

2 tablespoons of black currants
Rind and juice of 1 lemon
3 teaspoons of sugar
1 tablespoon of cornflour

Put the fruit, sugar, lemon juice, and rind in a saucepan, pour 1 pint of boiling water over them, and simmer them for 20 minutes. Strain the mixture and thicken it with the cornflour. Boil the tea for another 10 minutes and serve it hot or cold. Black currant jam or jelly may be used in place of the raw fruit.

This is a very pleasant drink for a person with a cold.

Mint Tea

1 quart of strong tea
1 pint of soda water
Mint
1 cup of castor sugar
½ pint of lemon juice
Ice

Strain the tea, add the sugar, and allow it to cool before adding the lemon juice and soda water. Place sprigs of lightly bruised mint in the glasses before serving the drink and add ice if desired.

Apple Water

2 large, firm apples
4 teaspoons of sugar
Rind and juice of ½ lemon

Wash the apples and cut them into thin slices. Place them in a jug with the sugar and the lemon rind and juice. Pour 1 pint of boiling water over the fruit and allow it to cool. The flavour is improved if this drink is left steeping for 24 hours.

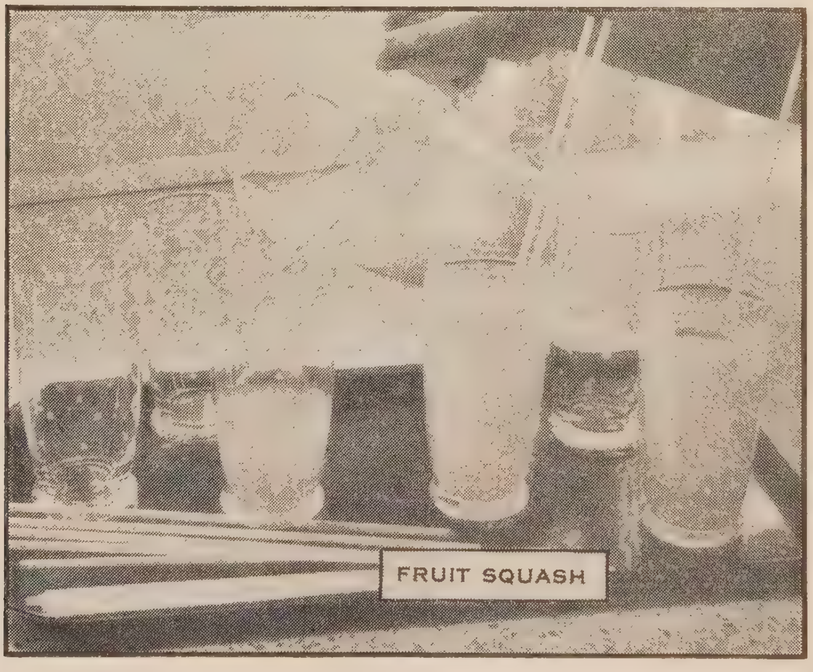
FRUIT PUNCH

[*Sparrow Industrial Pictures Ltd. photo.*

Punches

Drinks made from a mixture of fruit juices, punches may be either still or sparkling. The sparkling punches usually are made by replacing part of the water in the recipe with aerated water or ginger beer.

Slices of lemon or shredded or chopped fruit can be added when punch is served. Ice chips also improve the refreshing quality. A novel effect is obtained if the ice is circular.



FRUIT SQUASH

[*Sparrow Industrial Pictures Ltd. photo.*

Foundation Punch

3 cups of strained orange juice
2 cups of strained lemon juice
2 cups of sugar

Make the sugar into a syrup with 2 cups of water, cool it, and combine it with the fruit juice and 9 cups of water. Pour a small quantity into a punch bowl, add a block of ice, and pour the remainder of the punch over the ice. These quantities make 1 gallon.

Tea may be substituted for part of the water, and other sweetened fruit juices may be added for variety.

Grapefruit punch: Substitute grapefruit juice for lemon juice.

Pineapple or cherry punch: Allow 3 parts of foundation punch to 2 parts of pineapple or cherry juice.

Ginger Beer

2oz. of crushed ginger
1oz. of cream of tartar
1½lb. of sugar
½oz. of tartaric acid
1 cake of yeast

Prepare the yeast by dissolving it in 1 cup of lukewarm, boiled water. Boil the ginger in 6 quarts of water for 20 minutes. Strain it, add the cream of tartar and sugar, and stir them over heat until they are dissolved. Add the tartaric acid and leave the liquid until it is lukewarm. Add the yeast and strain and bottle the ginger beer. It is ready for use in 2 or 3 days and may be substituted for some of the water to make a sparkling punch.

Amber Orange Punch

4 oranges
1lb. of sugar
1 lemon

Grate the rinds from 2 of the oranges, add it to the sugar and 1 pint of water, and stir until the sugar is dissolved. Bring it to the boil and boil it for 5 minutes. Cool the liquid and stir in the juice of the lemon and the oranges. Last add 1 quart of cold water.

Cereal Waters

Though not fruit drinks, cereal waters are very cooling and thirst quenching and are useful in the shearing shed or the hay field.

Barley Water

Mix 1 tablespoon of patent barley powder to a thin cream with a little cold water. Pour on 1 pint of boiling water, stirring rapidly. Boil the mixture for 15 minutes, cool it, and add salt to taste.

Lemon Barley Water

1 pint of barley water
Rind of 1 lemon
3oz. of sugar
Juice of 2 lemons

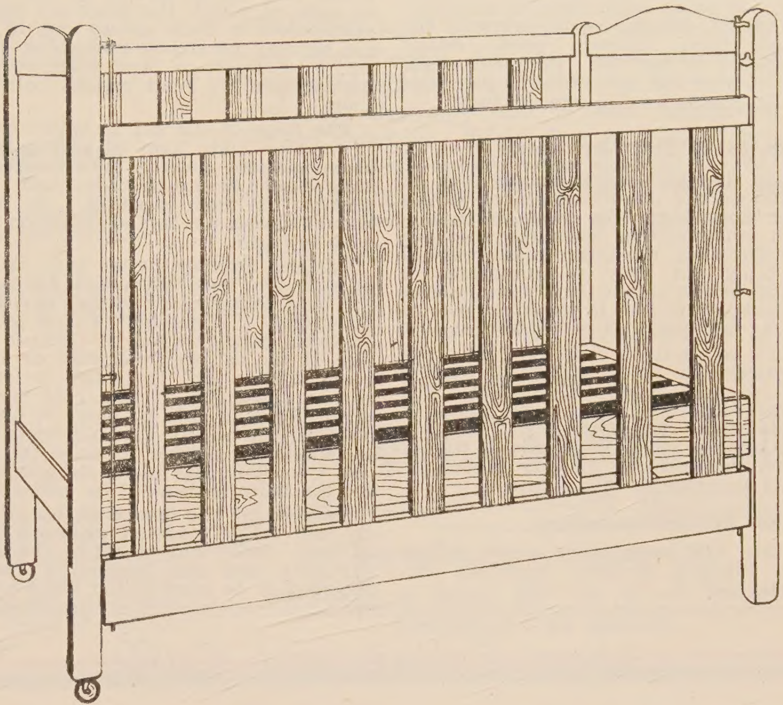
Put the sugar, water to cover it, and the lemon rind and juice in a saucepan and boil them for 10 minutes. Cool the mixture and strain it into the barley water.

Oatmeal Water

Pour 1 pint of boiling water over 1 tablespoon of oatmeal and allow it to stand for 2 hours. Add a pinch of salt. Strain the liquid and add lemon juice to it. The oatmeal may be used two or three times.

Children's Cots Should Hold No Dangers

A CHILD in his cot should be more secure than perhaps at any other time. Certainly he is left alone in his cot for far longer periods than in any other place. Yet, if the cot has not been made strongly and carefully, it can be literally a death-trap to the baby within it. This article by Eirene E. Unwin, Rural Sociologist, Department of Agriculture, Dunedin, stresses the danger of faulty construction and emphasises the value when buying a cot of ensuring that it conforms with the standard specifications quoted.



Solid ends to reduce draughts, floor of wooden slats in preference to a wire mattress, castors on only two legs to prevent the child moving the cot about, and slats or rungs in the sides no more than 2½in. apart—these are factors which contribute to a safe and healthy cot.

THE Standard Mark may appear on goods which are of better quality than the minimum specified, but its use on goods of lower quality than that called for by the standard specifications is an offence. Standard specifications are agreed on by manufacturers, distributors, and consumers, and their use is voluntary.

Four main dangers may be inherent in a cot of faulty design or construction.

Strength of Materials

A cot may be made of such flimsy materials as to be not strong enough for its purpose. The standard specification requires the following minimum dimensions for the parts of a cot:—

Legs	**1 5/8in. x 1 5/8in.**
Height from floor of cot to top of railing	**22 1/2in.**
Slats fastened with dowels	**1 3/8in. x 5/8in.**
Slats fastened with mortices	**1 5/8in. x 7/16in.**
Diameter of rungs	**1/2in.**
Top rail	**2in. x 7/8in.**
Bottom rail	**3 1/4in. x 7/8in.**

Good-quality, well-seasoned wood must be used in making the cots if they are to be "up to standard."

Slats or Rungs

The slats or rungs forming the sides of a cot may be dangerously far apart. Babies have been known to push their heads between the bars of their cots and, being unable to get them out again, have been strangled. Sometimes a child may be able to get both feet through one space, and if the whole body slips through too, as has happened, the baby may be hanged, for in this case the head does not slip through.

To avoid such accidents the bars must be not more than 2½in. apart. A baby could get neither his head nor both feet and legs through a space 2½in. wide, and this is the maximum spacing allowed in the standard specification for both cots and play-pens. If a cot already in use in the home has wider spaces than this between its bars, extra rods should be put in all round to make it safe. Smoothly rounded slats may be tacked on, or extra dowelling rods may be fitted by passing them right through a hole in the top rail and into a shallow hole in the bottom rail, afterward filling the upper part of the hole in the top rail with plastic wood.

Height of Sides

The sides of a cot may be so low that by the time the baby can stand he may be tall enough to pull himself up by the top rail and fall out. This is a real danger with an active baby. The standard specification requires that the distance from the floor of the cot to the top of the top rail be 22½in. If an unusually high mattress is to be used in the cot (higher than, say, 5in.), the height of the sides should be greater than 22½in. to allow a safe distance from the top of the mattress to the top of the rail.

When a child can put his elbows over the top of the cot he is too big for it, and unless the top rail can be raised, or an extra one put on, he must be promoted to a bed. Raising the sides of the cot is probably easier than trying to keep an active toddler in a bed which he finds he can get out of easily. If he must have a bed, it should be low and narrow, as then he feels more secure and is more easily kept warm.

Fastening of the Drop Side

The drop side may be insecurely attached to the cot or the fastening may be inadequate, so that it is impossible to fasten up the side really safely. The standard specification in this respect requires only that the fittings and catches of drop-side cots and play-pens shall be strong and securely attached, but in a note about hardware used in the making of furniture the following requirement is stated: "All hardware shall be of rugged construction, of a substantial pattern, and capable of withstanding severe usage. All hardware shall be neatly and accurately fitted, and shall be screwed with suitable screws or bolts."

Therefore the drop side of a Standard Mark cot should be strong and safe, unless the fastening is in such a position that the baby may reach it and undo it from inside the cot. Buttons underneath should be far enough from the outside edge for the baby to be unable to reach down and twist them. Bolts on the outside at the top are satisfactory if the weight of the drop side is sufficient to make it difficult to move the bolt without first lifting the side a little.

Training older children not to open the cot and so make it possible for the baby to fall out is the mother's responsibility.

RECOMMENDATIONS FOR CHILDREN'S COTS . . .

Rounding of Edges

The standard specification requires that "all sharp edges shall be smoothly rounded," which helps prevent the baby from having even minor accidents in his cot. Rounded edges can only bruise and do not cause cuts easily should he fall against them.

Purpose of Standard Mark

The Standard Mark usually will be found on the inner face of one of the rails supporting the floor of a cot. If a cot conforms with the standard specifications, the buyer knows that it is built not only to standards of sound construction and good-quality materials but also to the standards of safety required by the Plunket Society.

If a cot is to be made at home, the requirements listed should be studied and the cot made accordingly. The home carpenter may not be aware of some of the dangers and may tend to make the cot to fit the available timber instead of ensuring that the timber fits the requirements of a safe cot.

Other Recommendations

Here are some other points which the Plunket Society considers important:—

Beads should not be inset into an end or side. The wires supporting beads are not as strong as the slats or rods of which the sides are made, and before a baby grows out of his cot he may be strong enough to push the wires apart or bend them so that he can get his head caught between them.

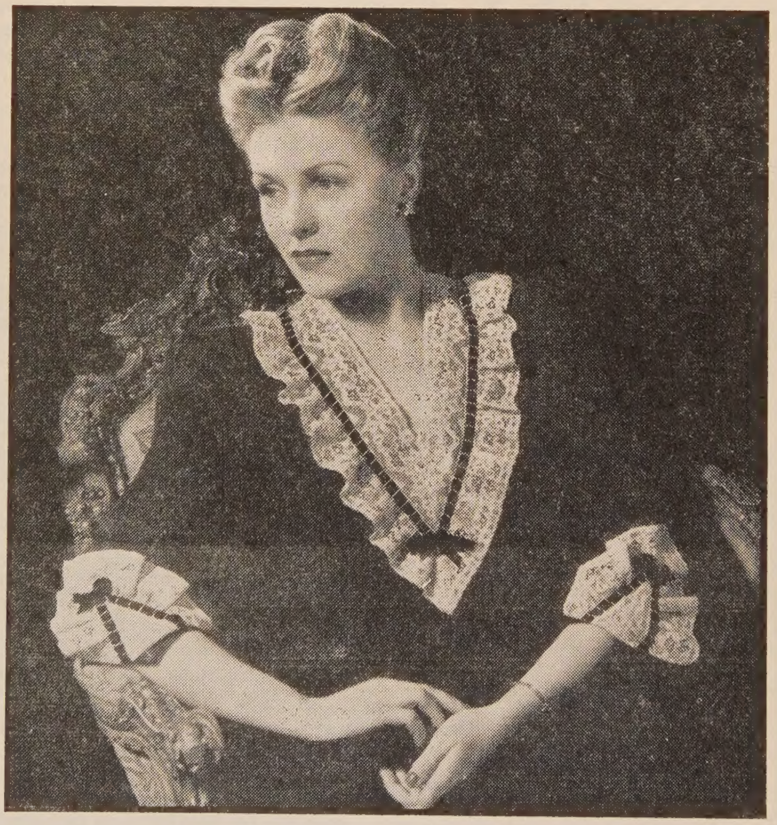
The floor of the cot is better made of wooden slats than of spring wire. Should a cot have a wire mattress, slats should be put in underneath it to prevent it from sagging. A baby should have a flat surface to lie on, not a hollow one.

Castors: Cots are better with castors on only two legs than on all four. As the baby grows older he can move his cot around if it has four wheels by his vigorous activity inside it. Should the cot be on an open veranda or in a room with a fire or heater or other source of danger, it is a real hazard if the baby is able to move it about. Two castors are all that are necessary to enable the mother to move the cot, and two plain legs make it impossible for the baby to move it by himself.

Solid ends: The head and foot of the cot are better made of plywood than of bars. Solid ends assist in checking draughts, and also frequently enable the mother to peep at her child without being seen or running the risk of disturbing him.

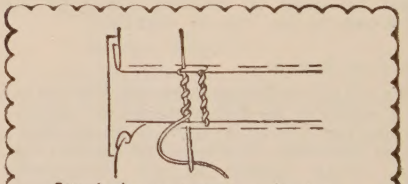
Paint and varnish: The paint used on a cot must contain no lead or other poisonous pigment, for a baby is certain to suck it at some time. An ordinary oil paint, especially if it is light in colour, is almost sure to contain white lead, which is very poisonous. Enamels must also be selected with caution, particularly green, yellow, and orange. For safety, home decorators should ask for a lead-free enamel when buying. If a priming coat and undercoat are used, as are necessary on new wood, the same restriction must apply. The paint may be coated with a good brand of clear varnish, which is quite harmless and protects the paint from damage or ordinary wear and tear. Of course, no surface will stand up to being chewed by a baby, but the varnish does help to protect it against sucking. Alternatively, the cot need not be painted but merely coated with a clear varnish. This is as easy to keep clean as paint and has the great advantage of being non-poisonous and therefore quite safe. New wood may be varnished satisfactorily by applying a coat of raw linseed oil mixed with mineral turpentine in about equal parts, followed when dry by a coat of knotting or french polish; one or more coats of varnish would then supply a glossy protective film.

Lace Collar and Cuffs



GLAMOUR for evening wear can be lent to a simple dark dress by this lace collar-and-cuff set. The materials required are 4½yds. of 2in.-wide lace and 2¼yds. of velvet ribbon.

For the collar cut a 31in. strip and a 66in. strip of lace. Join the ends of the short piece on a slant to make a V at the tront. Stitch darts at the centre back to make the collar lie flat. Tack it to paper. Gather one long edge of the other lace length and, starting at the V, tack it round the outer edge of the lace on the paper, leaving ½in. between them and drawing up gathers to make it fit. Join the ends at the centre front to make a V. Work a faggot stitch with bar between the lace strips as shown in the diagram. Thread ribbon through the bar and tie it in a bow. The collar is then ready to be removed from the paper.



Stitch down, twist needle into thread, then stitch upward

For each cuff cut two lengths of lace, one 7in. and the other 18in. Fold the short length in halves and stitch across the folded end at a slant to make a triangle. Tack it to paper. Arrange and join the long piece as for the collar. Bind the raw edges at the cuff base. Make the other cuff in the same way.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—28501

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